

Final

**Revised Remedial Investigation Report
for Parcel E**

**Hunters Point Shipyard
San Francisco, California**

Volume II of III

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4.0 DATA EVALUATION METHODS AND REMEDIAL INVESTIGATION RESULTS

This section describes the approach used to evaluate the nature and extent (see Section 4.1) and fate and transport of chemicals (see Section 4.2), and presents the results of these evaluations for each redevelopment block (see Section 4.3). The discussion of the nature and extent of chemicals for each redevelopment block is limited to those chemicals in soil, groundwater, and sediment that were identified during this evaluation as (1) most likely to present a potential human health or environmental concern and (2) potentially present because of past industrial operations. All chemicals are included in the HHRA for each redevelopment block for residential and industrial uses (see Appendix I).

Based on agreement between the Navy and the BCT and as a conservative approach, all detected chemicals in soil and groundwater, except four essential human nutrients (calcium, magnesium, potassium, and sodium), were evaluated as chemicals of potential concern (COPC) in the HHRA. That is, screening criteria were not used to identify COPCs for the HHRA. Thus, the HHRA characterizes cumulative, and total, risk from exposure to all detected chemicals in soil and groundwater, whether site-related or at ambient levels. The HHRA for soil also includes a characterization of incremental risk, which does not include risks from metals present at or below Hunters Point ambient levels (HPAL).

Data are not available in some Parcel E areas because sampling activities were focused primarily around known sources of contamination; as a result, the potential risk to human health and the environment in these areas is unknown. The Navy will address areas where little or no data are available and there remains uncertainty in the potential risk associated with exposure to soil, groundwater, and sediment by including these areas in the FS. Alternatives evaluated in the FS for these areas will seek to limit or eliminate pathways of exposure to soil, groundwater, and sediment to ensure protectiveness of human health and the environment.

4.1 NATURE AND EXTENT EVALUATION APPROACH

This section describes the approach used to evaluate the nature and extent of chemicals in soil, groundwater, and sediment at Parcel E. The evaluation of sediment applies only to the areas along the Parcel E shoreline and does not include the subtidal sediments of Parcel F.

The subsection for each medium identifies investigation data used to support this Revised RI Report and describes the process followed to (1) identify the chemicals selected for discussion and presentation of the nature and extent of chemicals and (2) evaluate the spatial distribution and determine the extent of chemicals in each medium.

4.1.1 Nature and Extent of Chemicals in Soil

This section describes the approach used to evaluate the nature and extent of chemicals in soil at Parcel E.

4.1.1.1 *Soil Analytical Data*

The soil analytical data used in this Revised RI Report, referred to as the RI data set, were generated during several investigations performed between 1986 and 2002. These investigations are summarized in Section 2.0 and Table 2-1; Appendix A provides a detailed discussion of the previous investigations conducted at Parcel E. Soil data from the following investigations were used to support this Revised RI Report:

- Triple A Investigation (1986)
- Confirmation Study, Verification Step (1987)
- Area Study (1987)
- SI (1993)
- 1997 RI Report (1988 to 1996)
- SDGI (2002)

Chemical analytical data from these investigations for soil samples collected at Parcel E that were not removed by excavations as of December 2004 are included in the comprehensive database maintained by the Navy. These data are from the Parcel D TCRAs (for areas now included in Parcel E that were formerly part of Parcel D), the TPH investigations and removal actions, and exploratory excavations. Also, prerule analytical data for soil samples in areas that have undergone removal actions since December of 2004 are included in the data set used for this Revised RI report. The data set used in the Revised Parcel E RI Report contains more than 4,700 soil samples; samples were analyzed for up to 275 chemicals. The full set of analytical results for soil is included in Appendix C. Appendix C contains a series of tables, including a cross-reference table for borings associated with each redevelopment block and IR site (see Table C-1), the analytical results for soil (see Tables C-2 through C-14), and the statistical results for soil (see Tables C-15 through C-38). The appendix tables present analytical and statistical results from two depth intervals (0 to 10 bgs and deeper than 10 feet bgs) and are organized by redevelopment block.

4.1.1.2 *Identification of Chemicals in Soil*

The Navy developed an approach for screening all chemicals detected in soil to identify chemicals for the discussion of nature and extent. This screening process is intended to focus the discussion and data presentation of the nature and extent of chemicals in each redevelopment block. This screening process is not used for the HHRA. As stated above, all chemicals are included in the HHRA for each redevelopment block (see Appendix I).

Table 4-1 lists the Parcel E RI screening criteria. The following screening criteria were used to identify chemicals in soil for evaluation of their nature and extent at each redevelopment block:

- Parcel E residential and industrial screening criteria are risk-based concentrations developed in the HHRA (protective of human health) (all analytical groups) (see Appendix I).
- HPALs (only for metals in soil) are statistically calculated metals concentrations representing ambient metal concentrations in soil at HPS (PRC 1995). HPALs are used at HPS to distinguish between ambient levels of metals at HPS which exist as a result of fill material and concentrations of metals that result from potential site-related activities.
- Practical quantitation limits (PQL) (for semivolatile organic compounds [SVOC] only) are considered the lowest concentrations that can be accurately measured and are used as screening criteria when greater than the risk-based criteria.
- Soil source criterion for TPH only was developed with the Water Board and is based on the potential for TPH to leach to groundwater (Shaw Environmental, Inc. [Shaw] 2007).

Although the intended reuse of most of Parcel E is industrial or recreational, the residential screening criteria were used initially to identify the chemicals in soil for the nature and extent evaluation. Industrial criteria were used in conjunction with the residential criteria as described below for redevelopment blocks with planned reuse as industrial, maritime/industrial, or open space.

The purpose of the nature and extent screening process was to identify areas where chemicals exceeded screening criteria appropriate for the planned reuse of the redevelopment block in contiguous sampling locations. Figure 4-1 illustrates the screening process used to identify chemicals in soil. Chemicals were first identified based on whether they were detected in soil and whether they exceeded Parcel E residential screening criteria. If Parcel E residential screening criteria were exceeded, then the chemical was listed in the summary statistics tables presented for each redevelopment block in Section 4.3. Chemical concentrations were also compared with industrial screening criteria for redevelopment blocks with planned reuse as industrial, maritime/industrial, or open space. Next, each chemical was evaluated by considering percent of detections that exceeded the screening criteria appropriate for the reuse (residential or industrial, based on planned reuse of the redevelopment block). Based on this consideration, professional judgment was used to determine whether an analytical group-specific figure (for example, metals or VOCs) was prepared for a redevelopment block. The analytical group-specific figures generated for each redevelopment block show locations where screening criteria appropriate for the reuse were exceeded for any analytes within the analytical group. The relative magnitude of the results that exceeded screening criteria is illustrated using symbols graduated by size and color.

Total TPH (TTPH) in soil was evaluated differently than the process for CERCLA chemicals shown on Figure 4-1. TTPH is the sum of the TPH fractions for gasoline (TPH-g), diesel (TPH-d), and motor oil (TPH-mo). TTPH also includes the sum of TPH fractions for unknown purgeable hydrocarbons (TPH-p) and unknown extractable hydrocarbons (TPH-e) when the

analytical laboratory quantified these unknown compounds. The TTPH soil source screening criterion was developed with the Water Board and is based on the potential for TPH to leach to groundwater (Shaw 2007). If TTPH concentrations exceeded the soil source screening criterion in an area where CERCLA chemicals also exceeded Parcel E screening criteria, then TPH is evaluated as part of this Revised Parcel E RI Report. However, at TPH sites where the CERCLA chemicals may be related to a release of fuels or other hydrocarbons, these CERCLA chemicals are addressed under the TPH program. Such TPH sites are not discussed further in this Revised RI Report and are evaluated as part of the TPH program at HPS. TPH soil screening criteria for HPS are listed in Table 4-1. In 2007, the Navy and the Water Board developed a revised strategy for the petroleum program and associated preliminary screening criteria for HPS, which provides step-wise, risk-based decision criteria for TPH, TPH-related VOCs (benzene, ethylbenzene, toluene, xylenes, and methyl tertiary-butyl ether), and selected TPH-related polynuclear aromatic hydrocarbons (PAH) (Shaw 2007).

4.1.1.3 *Evaluation of Spatial Distribution and Extent of Chemicals in Soil*

The spatial distribution was evaluated by reviewing figures that show the locations where chemical concentrations exceeded applicable screening criteria (such as residential or industrial screening criteria, or HPALs or PQLs if greater than the applicable reuse screening criteria) in soil. These figures are presented by analytical group for each redevelopment block in Section 4.3. The spatial distribution of the chemical concentrations was evaluated to identify the areas where chemicals are present at concentrations exceeding screening criteria at multiple contiguous locations. The extent of chemicals in soil at isolated locations with a chemical concentration exceeding screening criteria and with no other elevated concentrations found in samples nearby was not evaluated.

The extent of chemicals in soil and the potential source of the chemicals were evaluated for each area that was identified as having multiple contiguous sampling locations where Parcel E screening criteria were exceeded. The approximate extent of an area was based on (1) analytical data exceeding the applicable reuse screening criteria, HPAL, or PQL; (2) aerial photographs; and (3) direct physical inspection.

4.1.2 *Nature and Extent of Chemicals in Groundwater*

This section describes the approach used to evaluate the nature and extent of chemicals in groundwater at Parcel E.

4.1.2.1 *Groundwater Analytical Data*

The groundwater analytical data used in this Revised RI Report, referred to as the RI data set, were generated during several investigations performed between 1987 through December 2004. These investigations are summarized in Section 2.0 and Table 2-1; Appendix A provides a detailed discussion of the previous investigations conducted at Parcel E. Groundwater data from the following investigations were used to support this Revised RI Report:

- Confirmation Study, Verification Step (1987)
- SI (1993)
- 1997 RI Report (1988 to 1996)
- Phases I, II, and III GDGI (2000, 2001, and 2002)
- Monitoring data collected during three quarterly sampling events conducted in 2004 under the BGMP (2004)

Chemical analytical data from these investigations are included in the comprehensive database maintained by the Navy. Groundwater data collected from monitoring wells were used in the nature and extent evaluation. Data from grab groundwater samples were not included in the evaluation data set for the following reasons: (1) data were collected during the early 1990s, and (2) the detected concentrations tend to be biased high and are not representative of actual concentrations of chemicals in groundwater. However, data from grab groundwater samples were used in evaluating the source locations and when delineating plumes of chemicals in groundwater (see Section 4.1.2.3). The results from grab groundwater samples were presented and evaluated in the Draft Final Parcel E RI Report (Tetra Tech, LFR, and U&A 1997) and in the Phase II and III GDGI Reports (Tetra Tech 2001, 2004c).

The grab groundwater samples included samples collected using a Hydropunch sampler and samples obtained from open boreholes (usually collected from the annulus of hollow-stem augers or driven casings). Hydropunch samples and grab groundwater samples were collected during characterization sampling conducted between 1990 and 1996 (PRC, LFR, and U&A 1996; Tetra Tech, LFR, and U&A 1997). Grab groundwater samples generally are more turbid than those collected from monitoring wells, and metals and hydrophobic chemicals (such as chemicals that repel, tend not to combine with, or are incapable of dissolving in water) may sorb to colloidal matter, which passes through the 0.45-micrometer filter that is routinely used in the field. Therefore, the concentrations of metals and hydrophobic chemicals measured in grab groundwater samples tend to be biased high, even after samples are filtered.

Overall, data from monitoring wells at Parcel E were found to be sufficient and considered to be more reliable for the evaluation of the nature and extent of chemicals in groundwater at Parcel E. More than 1,200 groundwater samples were analyzed for 325 chemicals. The full set of analytical results for groundwater samples collected at Parcel E as of December 2004 is included in Appendix D. Appendix D contains a series of tables, including a cross-reference table for groundwater monitoring wells associated with each redevelopment block and IR site (see Table D-1), the analytical results for groundwater (see Tables D-2 through D-11), and the statistical results for groundwater (see Tables D-12 through D-26). The appendix tables present analytical and statistical results for the A-aquifer, B-aquifer, and bedrock water-bearing zone and are organized by redevelopment block. Groundwater data collected at Parcel E as part of the ongoing groundwater monitoring program at HPS subsequent to December 2004 will be evaluated further in the FS. Grab groundwater data are included in Appendix K. Figure K-1 shows grab and Hydropunch groundwater sample locations, and Table K-1 lists the borings from which the samples were collected. The analytical results for grab and Hydropunch groundwater samples are included in tables arranged by IR site as presented in the Draft Final Parcel D and E RI Reports (PRC, LFR, and U&A 1996; Tetra Tech, LFR, and U&A 1997).

4.1.2.2 Identification of Chemicals in Groundwater

The Navy developed an approach for screening all chemicals detected in groundwater samples to identify chemicals for the discussion of nature and extent. This screening process is intended to focus the discussion and data presentation of the nature and extent of chemicals in each redevelopment block. This screening process is not used for the HHRA. As stated above, all chemicals are included in the HHRA for each redevelopment block (see Appendix I).

Table 4-1 lists the Parcel E RI screening criteria. The following screening criteria were used to identify the chemicals for their evaluation of the nature and extent in groundwater at each redevelopment block:

- Hunters Point groundwater ambient levels (HGAL) are metals concentrations representing ambient metals concentrations in groundwater at HPS (PRC 1996f) (A-aquifer only).
- Residential vapor intrusion criteria are risk-based concentrations for VOCs and SVOCs and are applied to the A-aquifer and areas in the B-aquifer where A- and B-aquifer are connected. The vapor intrusion criteria were calculated as part of the HHRA (see Appendix I).
- Domestic use criteria are risk-based concentrations for metals and organic chemicals published by EPA and applied to the B-aquifer only (EPA 2003).
- MCL are drinking water standards for metals and organic chemicals (B-aquifer only).
- Surface water criteria are ecological screening values, based on established federal and state aquatic ecological screening criteria for metals and organic chemicals (A- and B-aquifers).
- TPH groundwater screening criteria for HPS were developed with the Water Board and are based on protection of human health and ecological receptors in the Bay (Shaw 2007).

Figure 4-2 illustrates the screening process used to identify chemicals in groundwater for discussion of their nature and extent. Chemicals were first identified based on whether they were detected in groundwater. If a chemical was detected in groundwater samples, it was listed in the summary statistics tables presented for each redevelopment block in Section 4.3. Chemicals with detections exceeding appropriate groundwater criteria (such as vapor intrusion, surface water, or domestic use criteria, or HGALs or PQLs if greater than the appropriate criteria) are shaded and shown in bold in the summary statistics tables. Next, the nature and extent of each chemical detected above the appropriate screening criteria was evaluated by considering several factors, including (1) the percent of detection, (2) the percent of detections exceeding appropriate screening criteria, (3) the date of most recent detection in the RI data set, and (4) the spatial distribution and temporal trend of the chemical.

The Navy also evaluated TTPH in groundwater. TTPH is the sum of the TPH fractions for TPH-g, TPH-d, and TPH-mo. TTPH also includes the sum of TPH fractions for TPH-p and TPH-e when the analytical laboratory quantified these as “unknown compounds.” TPH groundwater screening criteria for HPS are dependent on the distance to the shoreline and are listed in Table 4-1. As a conservative measure, groundwater data in each redevelopment block were compared with TPH criteria based on the distance to the Bay of the closest groundwater monitoring well within the redevelopment block. In 2007, the Navy and the Water Board developed a revised strategy for the petroleum program and associated preliminary screening criteria for HPS, which provides step-wise, risk-based decision criteria for TPH, TPH-related VOCs (benzene, ethylbenzene, toluene, xylenes, and methyl tertiary-butyl ether), and selected TPH-related PAHs (Shaw 2007).

4.1.2.3 *Evaluation of Spatial Distribution and Extent of Chemicals in Groundwater*

For those chemicals with concentrations that consistently exceeded screening criteria in samples collected from contiguous groundwater monitoring wells, parcel-wide figures show plumes delineated based on the last three quarters of 2004 data (or earlier years if 2004 data were not available). For most cases, these plumes were defined by data from 2004; therefore, these plumes will be referred to throughout the remainder of the text and on the figures as “2004 groundwater plumes.” However, because of a lack of 2004 data, some plumes or portions of plumes were defined by earlier data (generally by 2002 and occasionally by 2001 or 1996 data). These plumes conservatively approximate potential 2004 plumes and will still be referred to as “2004 groundwater plumes.” This section describes the methods used to define 2004 groundwater plumes for each analytical group. The process of delineating 2004 groundwater plumes involved three main steps:

1. Data preparation
2. Automatic contouring of data
3. Manual adjustment of the derived contours (or plume delineation based on professional judgment)

The data preparation step required querying the database to retrieve:

- The maximum concentration of a chemical from the last three quarters of data from 2004, if available
- The maximum concentration of a chemical from the last two quarters of data, if three quarters of 2004 data were not available
- The higher detected value of an original or duplicate sample (or the higher detection limit if chemical concentrations in both the original and duplicate samples were nondetected)

The automatic contouring of the retrieved data was performed using a Natural Neighbor interpolation algorithm (Golden Software, Inc. 2002); with the nondetected concentrations assigned half of the actual detection limits. The outer contours for the plumes were defined differently for analytical groups using the following criteria:

- Metals: HGALs
- VOCs: Residential vapor intrusion criteria for groundwater
- PCBs and Pesticides: Surface water criteria
- TPH: Groundwater screening criteria for HPS, which vary with the distance from the Bay (Shaw 2007)

The automated contouring was not appropriate for delineating plumes for most chemicals because of the sporadic distribution of detected concentrations and the large number of nondetected concentrations. In most cases, professional judgment of a hydrogeologist with professional geologist certification was used to determine the final plume area.

The initial plume contours, derived using the automatic contouring algorithm, were manually adjusted to account for groundwater flow directions and temporal or spatial trends in chemical concentrations. To define plume configurations, the observed spatial and temporal distributions of a chemical were related to groundwater flow patterns observed historically through 2004. The final plume configuration was elongated in the direction of groundwater flow, with one or more wells defining the plume if (1) chemical concentrations consistently exceeded screening criteria (stable or increasing temporal trends), and (2) a chemical was present in one or more adjacent wells (spatial trend). In addition, data from grab groundwater samples (see Appendix K) were referred to when finalizing the configuration of a plume. The plume contour would include grab sample locations if grab groundwater concentrations exceeded the Parcel E screening criteria.

Groups of chemicals that could represent parent compounds or degradation products also were evaluated for consistency of detections and magnitude of concentrations. If known, the suspected sources of contamination in groundwater were related to historical site activities and evaluated based on the observed trends of chemical concentrations over time.

The resulting 2004 groundwater plumes highlighted consistent detections of a chemical in groundwater above the respective criteria based on the most recent sampling rounds in the RI data set through December 2004. The risk plumes discussed in Section 5.1.1.2 were developed using a different approach and focused on any historical detections of VOCs.

4.1.3 Nature and Extent of Chemicals in Sediment

The nature and extent of chemicals in sediments at the Parcel E shoreline are presented in detail in the Parcels E and E-2 Shoreline Characterization Technical Memorandum (see Appendix G) and summarized in Section 4.3.14. The purpose of the Parcels E and E-2 Shoreline Characterization Technical Memorandum was to evaluate if contamination in the Parcels E and E-2 shoreline migrated, or has the potential to migrate, to sediments in adjacent Parcel F (offshore); and to identify areas within the shoreline that pose a potential unacceptable ecological risk. Results of the evaluation were intended to help the Navy prioritize shoreline actions by identifying the areas along the shoreline that pose the greatest potential for contaminating offshore sediments in Parcel F.

The sediment analytical data used to support this Revised RI Report are from the shoreline portion of the SDGI performed between August 2002 and September 2002. Results of the SDGI were summarized in the Data Summary Report (Tetra Tech 2005) and the Parcels E and E-2 Shoreline Technical Memorandum (presented in Appendix G of this Revised RI Report).

Two types of sampling methods were used to characterize shoreline sediments: systematic and biased. Systematic samples were collected every 100 linear feet from 0 to 0.5 and 2 to 2.5 feet bgs along the entire shoreline. These samples were screened for copper and lead, using X-ray fluorescence techniques and for PCBs using immunoassay techniques (Tetra Tech 2002a). Biased samples were collected from two potential source areas along the Parcel E shoreline known as the kiln brick and metal debris reef areas. Samples from these two locations were analyzed for total metals (including hexavalent chromium), SVOCs, pesticides, PCBs, and dioxins and furans. Samples were not analyzed for VOCs because VOCs readily volatilize in the turbulent shoreline environment.

Table 4-1 lists the sediment screening criteria for the shoreline. The approach for determining nature and extent for sediment was to compare sediment data with screening criteria listed in Table 4-1. The primary objective of the screening criteria developed for the shoreline sediments was to delineate the release of copper, lead, and PCBs resulting from site activities that could be a source of contamination to sediments in adjacent Parcel F (offshore). Any shoreline area that exceeded the Bay ambient sediment concentrations was identified as a potential source area.

4.2 FATE AND TRANSPORT EVALUATION APPROACH

This section describes the approach used to evaluate the fate and transport of chemicals in soil, groundwater, and sediment at Parcel E. The evaluation of sediment applies only to the areas along the Parcel E shoreline and does not include the subtidal sediments of Parcel F.

The approach used to evaluate the fate and transport of chemicals involves identifying (1) probable migration pathways and (2) physical and chemical characteristics that may influence mobility of chemicals in a specific medium. The following subsections present a detailed discussion of the pathways and characteristics likely to be encountered throughout Parcel E.

Section 4.3 includes a discussion of fate and transport of chemicals, specific to each redevelopment block.

4.2.1 Probable Pathways

The following potential chemical migration pathways were identified at Parcel E:

- Leaching from soil to groundwater by infiltrating precipitation or as a result of fluctuating groundwater levels
- Discharge from groundwater to surface water through direct discharge or via leaking utility lines (including backfill material in utility line corridors)
- Volatilization from soil or groundwater to the atmosphere
- Wind entrainment of dust-size particles from surface soils to the atmosphere or to surface water
- Transport of soil or sediment to surface water with overland flow of storm water

Each of the potential pathways is discussed below.

The primary mechanism of migration of chemicals from soil to groundwater at Parcel E is most likely through leaching by infiltrating precipitation or from a rise in the water table during the wet season. The average annual depth to water throughout Parcel E is about 8 feet bgs; because groundwater is shallow, more mobile chemicals may reach groundwater relatively quickly. As a result of increased precipitation during the wet season (December through March), the water table may be approximately 2 feet higher in the winter than during the dry season (April through November) (Tetra Tech 2004c). Increased leaching of chemicals may occur during the wet season if groundwater comes into contact with chemicals in soil.

Migration of chemicals from soil and groundwater to surface waters may occur if groundwater discharges to the Bay or if a groundwater plume is in contact with storm drain or sanitary sewer lines that are below the water table. If groundwater leaks into these lines and these lines discharge to the Bay, chemicals could be delivered directly to the Bay. The Navy intends to remove storm drain and sanitary sewer lines throughout HPS by 2012 according to current plans under the FFA Schedule (Navy 2007). The line excavations will be backfilled and compacted, eliminating this direct migration pathway. Once the storm sewer lines are removed, storm water will be managed through engineered drainage swales. Because this migration pathway may currently exist, it is discussed in each redevelopment block-specific subsection if leaking utility lines are suspected to be present in the redevelopment block and are likely to enhance chemical migration away from source areas.

Migration of chemicals from soil to the atmosphere through volatilization is expected to be very limited at Parcel E, given the time that has elapsed since VOCs were last used in industrial processes at Parcel E. The chemicals that have a high potential to volatilize are likely to have already volatilized. Migration of chemicals from groundwater to the atmosphere through volatilization may occur where VOC groundwater plumes exist. The migration pathway is discussed in each redevelopment block-specific subsection if VOC concentrations exceeded Parcel E screening criteria based on data collected through 2004 as identified in the redevelopment block during the nature and extent evaluation.

Migration of chemicals from surface soil to the atmosphere or to surface water through wind entrainment is likely to be very limited at Parcel E. Based on air quality studies (Tetra Tech, LFR, and U&A 1997), windblown dust does not generally affect air quality at Parcel E (see Section 3.2). In addition, only 6 acres, of the 138 acres that make up Parcel E, are unvegetated bare dirt exposed to wind. As a result, this pathway is not discussed further for any of the redevelopment blocks.

Migration of chemicals from soil to surface water through transport of solids with overland flow is expected to be limited at most of Parcel E because of the following conditions: (1) most of the storm water runoff is currently controlled by a storm sewer system across Parcel E and in the future will be controlled by engineered drainage swales; and (2) flat surface topography throughout Parcel E inhibits transport of solids with overland flow over significant distances. Because a greater potential for erosion exists at the shoreline portions of Redevelopment Blocks EOS-1, EOS-2, and EOS-3 because of steeper topography (see Figure 3-3), the potential transport of solids with overland flow is evaluated for these three redevelopment blocks in Section 4.3.

4.2.2 Physical and Chemical Characteristics

This section summarizes (1) the physical, chemical, and biological processes that affect migration of chemicals at Parcel E; (2) the physical and chemical properties of compounds that control mobility and persistence in the environment; and (3) site-specific conditions that affect chemical fate and transport at Parcel E. The physical characteristics of the site and of the chemicals were evaluated to determine the likely migration pathways and fate of chemicals identified in soil and groundwater during the nature and extent evaluation for each redevelopment block. The discussion is based on a qualitative evaluation of fate and transport for selected chemicals. The redevelopment block-specific subsections presented in Section 4.3 discuss the degree to which a chemical is transported via a particular pathway.

4.2.2.1 Physical, Chemical, and Biological Fate and Transport Processes

This section summarizes the physical, chemical, and biological processes that were considered during the evaluation of the fate and transport of chemicals released to the environment at Parcel E. Appendix H provides a detailed discussion of these fate and transport processes.

A number of chemical, physical, and biological processes are known to govern the fate of inorganic and organic chemicals in environmental media. The actual fate of chemicals in natural systems is often controlled by a complex interplay of processes. For example, chemicals released to soil as a result of industrial operations at Parcel E can be leached and transported vertically through the vadose zone. The soil leachate may then enter the saturated zone, mix with uncontaminated groundwater in a mixing zone, and be transported laterally to the Bay. As chemicals migrate through soil and groundwater, they are subjected to physical, chemical, and biological processes that tend to reduce their concentrations. These processes include the following:

- Sorption onto soil particles in both the saturated and unsaturated zone
- Volatilization from soil or groundwater (through soil as soil gas) to the atmosphere
- Chemical transformation (for example, oxidation-reduction, hydrolysis, and precipitation from solution)
- Biological transformation (biodegradation)
- Physical mechanisms such as hydrodynamic dispersion and molecular diffusion

Sorption retards movement of a chemical and changes the relative amount of its mass in each phase. Volatilization reduces both the chemical concentration and its mass in the subsurface as chemicals are released to the atmosphere. Similarly, chemical and biological transformation processes reduce both concentration and mass of a chemical in soil and groundwater. Physical mechanisms, such as hydrodynamic dispersion and molecular diffusion, may reduce the chemical concentration, but not the total mass of a chemical in the subsurface.

In the aquifer, dilution of soil leachate (that arrives from the vadose zone) with groundwater reduces chemical concentrations before contaminated groundwater reaches the shoreline. Additional dilution may take place in the tidally influenced zone near the shoreline because of groundwater mixing with brackish Bay water.

The relative importance of each process within a particular system and the interactions among processes typically depend on the specific properties of the chemical and the subject media.

4.2.2.2 *Physical and Chemical Properties of Inorganic and Organic Chemicals*

This section summarizes the physical and chemical properties of chemicals that influence their fate and transport in soil and groundwater. Appendix H presents a detailed description of physical and chemical parameters for individual inorganic and organic chemicals identified in soil and groundwater at Parcel E.

The physical and chemical properties of chemicals determine their behavior in soil and groundwater environments. General physical and chemical properties of inorganic and organic chemicals that affect their migration and persistence in soil or groundwater are summarized in the table below.

Chemical	Sorption to Soil	Solubility in Water	Volatilization Potential	Biodegradation Potential	Bioaccumulation Potential
Inorganic Chemicals					
Metals	Moderate to strong under neutral to basic pH, except for oxyanions such as chromate, selenate, and arsenate	Low to moderate in neutral pH groundwater, or high in low pH groundwater	Low to not volatile	Low	Low to high, depending on metal
Organic Chemicals					
VOCs	Low to moderate	Moderate to high	High	Low to high, depending on prevailing (aerobic or anaerobic) conditions	None
SVOCs	Moderate to strong	Low to none	Low to moderate	Moderate	May bioaccumulate
Pesticides	Strong	Low to none	Low	Low to moderate	High
PCBs	Very strong	Virtually insoluble	Low	Low to moderate	High

As indicated by general characteristics, metals and VOCs are expected to be most mobile in soil and groundwater at Parcel E. SVOCs, pesticides, and PCBs are expected to be relatively immobile.

4.2.2.3 Site-Specific Conditions Affecting Chemical Fate and Transport

This section describes general site-specific conditions that affect chemical fate and transport at Parcel E. Specifically, this section summarizes information on (1) soil types in unsaturated subsurface media and vadose zone geochemical conditions; (2) surface topography for redevelopment blocks where runoff (overland flow) may affect chemical redistribution or migration to the Bay; and (3) proximity to shoreline and resultant groundwater flow patterns and tidal influences.

Soil Types and Geochemical Characteristics of Vadose Zone

Soil types affect chemical migration through the vadose zone in both the aqueous phase and the vapor phase. The vadose (unsaturated) zone is on an average about 8 feet thick across Parcel E. Chemicals released to surface soils at Parcel E would have to traverse about 8 feet of vadose zone before reaching the water table. The rate of transport through the vadose zone is a function of the soil types; coarse-grained soils allow more rapid transport than fine-grained soils. Clayey

soils and soils high in total organic carbon (TOC), iron, and manganese have higher adsorption affinity to retard the movement of metals and organic compounds in aerobic conditions within a moderate pH range. In addition, soil type affects the ability of VOCs to migrate from groundwater as soil gas to the atmosphere or to intrude into buildings; fine-grained sediments such as silt and clay inhibit migration of soil gas.

As presented on cross sections (see Figures 3-4, 3-5, and 3-6), the vadose zone at Parcel E is composed of very heterogeneous Artificial Fill materials. The table below summarizes the predominant soil type and depth to groundwater for each redevelopment block. The predominant soil type is Artificial Fill, with a fairly high potential for migration of chemicals through the vadose zone to groundwater.

Redevelopment Block	Predominant Soil Type in the Vadose Zone ^a	Average Depth to Groundwater (feet bgs)
Mixed Reuse/Research and Development – 31A	Sand and gravel with boulders	No wells within block
Industrial Reuse – 31B/36	Silty gravel and sand	8.3
Industrial Reuse – 40	Sand and gravel with clay, silt and boulders	6.1
Industrial Reuse – 41	Clayey gravel with sand and boulders	6.2
Industrial Reuse – 43	Clayey gravel with sand and boulders	7.3
Industrial Reuse – 44	Clayey and silty sand, gravel and boulder fill	8.1
Mixed Reuse/ Research and Development – 45	Clayey and silty sand, sandy clays, gravel and boulder fill	9.6
Industrial Reuse – EMI-1	Sand and gravel with clay, silt and boulders	8.8
Open Space – EOS-1	Silty and clayey sand with gravel	9.3
Open Space – EOS-2	Sand and gravel with clay, silt and boulders	8.7
Open Space – EOS-3	Sand and gravel with clay, silt and boulders	6.0
Open Space – EOS-4	Clayey sand with gravel	No wells within block
Open Space – EOS-5	Clayey gravel, silty sand	No wells within block

Note:

- a Based on classifying soils from the boring logs per Unified Soil Classification System (Source: Casagrande, A. 1948. "Classification and Identification of Soils." *Transactions of the American Society of Civil Engineers.*).

The soil to groundwater migration pathway was evaluated for each redevelopment block. The potential for chemicals to leach from soil and reach the water table were evaluated by considering properties of the vadose zone materials such as pH (for metals) and TOC (for organic chemicals).

The shallowest depth to groundwater within a particular redevelopment block was used in assessing the potential migration to groundwater. The likelihood that chemicals remaining in soil may affect groundwater in the future was evaluated qualitatively using the vadose zone soil properties and depth to groundwater.

Most metals found in soil are expected to be immobile based on an average pH of 7.5 in soil from 0 to 10 feet bgs at Parcel E. The average pH was calculated by (1) converting each pH measurement to its respective hydrogen ion concentration, (2) taking the mean of the resulting hydrogen ion concentrations, and then (3) converting this mean back to pH. Although pH of rainfall may be neutral or slightly acidic, soil pH will generally remain unaffected.

Average TOC content in soil from 0 to 10 feet bgs at Parcel E is 1.5 percent, which suggests that sorption to soil can be significant for most organic chemicals, especially in Redevelopment Blocks 43, 44, EMI-1, and EOS-1. The table below lists the average values for pH and TOC for shallow soil (Artificial Fill from 0 to 10 bgs).

Redevelopment Block	pH	TOC (%)
Mixed Reuse/ Research and Development – 31A	8.6	No TOC analysis
Industrial Reuse – 31B/36	7.6	0.2
Industrial Reuse – 40	7.3	No TOC analysis
Industrial Reuse – 41	8.2	No TOC analysis
Industrial Reuse – 43	8.2	1.8
Industrial Reuse – 44	7.3	2.5
Mixed Reuse/Research and Development – 45	7.1	0.7
Industrial Reuse – EMI-1	7.8	1.9
Open Space – EOS-1	7.6	2.6
Open Space – EOS-2	8.0	No TOC analysis
Open Space – EOS-3	8.3	Not detected (based on one result)
Open Space – EOS-4	No pH samples	No TOC analysis
Open Space – EOS-5	7.3	No TOC analysis

Surface Topography

Flat surface topography throughout Parcel E inhibits transport of solids via overland flow over significant distances (see Figure 3-3). Surface runoff is also affected by pavement. Paved areas promote considerably more runoff than unpaved areas, but prohibit entrainment of contaminated soils. Based on evaluation of solids delivery from Parcel E to Parcel F presented in the “Evaluation of Storm Water and Solids Delivery to Parcel F” (Tetra Tech 2002b), there is a low potential for erosion at Parcel E.

Redevelopment Blocks EOS-1, EOS-2, and EOS-3 are the primary redevelopment blocks where migration of chemicals adsorbed to solids may occur with overland flow. The potential for erosion is somewhat greater at the shoreline portions of these blocks because of a steeper topography (see Figure 3-3). However, most of the shoreline area is lined with riprap to help control erosion. Section 4.3 discusses the potential for transport of chemicals with overland flow at these redevelopment blocks.

Additionally, there is a potential for transport of contaminated solids into the storm drains with surface runoff. However, such potential is expected to be low because of the flat topography of Parcel E and low potential for soil erosion.

Proximity to Shoreline/Tidal Effects

Based on the evaluation of groundwater flow patterns at Parcel E during the wet season (see Figure 3-9), the direction of groundwater flow is generally away from the Bay in all redevelopment blocks, except for the shoreline portions of Redevelopment Blocks EOS-1, EOS-2, EOS-3, and EMI-1. However, after the storm drain and sanitary sewer lines are removed, it is assumed that the general groundwater flow direction at Parcel E will likely be toward the Bay. Groundwater discharge to the Bay via subsurface seepage is especially important at the shoreline redevelopment blocks at Parcel E (Redevelopment Blocks EOS-1, EOS-2, and EOS-3) because the chemical plumes in groundwater at these blocks are close to the Bay.

4.3 REMEDIAL INVESTIGATION RESULTS

For each redevelopment block, this section presents the site background, results of the nature and extent screening process, extent of selected chemicals in soil and groundwater, and fate and transport of selected chemicals. The RI results for the Parcel E shoreline are presented in a separate shoreline section, after the redevelopment blocks.

The nature and extent screening process described in Section 4.1 is summarized in a series of tables and figures for each redevelopment block. The summary statistics tables identify the factors that contribute to the selection of a chemical. Values for factors contributing to the selection of a chemical are shown in bold font in the summary statistics tables and selected chemicals are shaded and shown in bold font. Those chemicals that have bolded factor values, but are not selected, are footnoted to indicate why the chemical was not selected. Figures showing the extent of selected chemicals in soil, by analytical group, are presented by redevelopment block. Figures showing the extent of selected chemicals in groundwater are presented parcel-wide to best delineate 2004 groundwater plumes in Parcel E. Figures 4-3, 4-4, 4-5, and 4-6 are parcel-wide figures showing metals, VOCs, pesticides and PCBs, and TPH, respectively, detected in groundwater at concentrations above screening criteria across Parcel E. Tables 4-2, 4-3, 4-4, and 4-5 present the groundwater data for metals, VOCs, pesticides and PCBs, and TPH, respectively, presented on the respective groundwater figures.

4.3.1 Redevelopment Block 31A

This section summarizes the site characterization of Redevelopment Block 31A, including the site history (see Section 4.3.1.1), the geology and hydrogeology (see Section 4.3.1.2), the nature and extent of chemicals in soil (see Sections 4.3.1.3), and the fate and transport of chemicals in soil (see Section 4.3.1.4). No groundwater samples were collected at Redevelopment Block

31A; therefore, no discussion of chemicals in groundwater is presented. The planned reuse for this block is mixed use. No tenants are currently present on this redevelopment block.

4.3.1.1 Site History

Redevelopment Block 31A is located in the northeastern portion of Parcel E. This block includes a portion of one IR site (IR-36 North). Site features within Redevelopment Block 31A are shown on Figure 1-13. The northern portion of Building 400 is the only portion of IR-36 North located within Redevelopment Block 31A. A full description of IR-36 North is presented in Section 4.3.2.1.1. Building 400 was used by the Navy as a storehouse for decommissioned ship parts and other equipment. During a 1988 survey, inventoried chemicals at this building included acetylene and oil containing PCBs (HLA 1990b). In June 2005, Building 400 was leased to Bay Storage Distribution Company (Navy 2005b). As of June 2007, Building 400 was vacant (Tetra Tech 2007a).

Limited data were collected at Redevelopment Block 31A because activities conducted at this redevelopment block were not likely to have resulted in contamination to the environment.

4.3.1.2 Geology and Hydrogeology

This section briefly discusses the geological and hydrogeological features beneath Redevelopment Block 31A. A full description of geology and hydrogeology at Parcel E is presented in Sections 3.4 and 3.5, respectively.

Asphalt and concrete paving and concrete building foundations cover most of Redevelopment Block 31A. Parcel-wide cross sections shown on Figures 3-4, 3-5, and 3-6 do not traverse this redevelopment block, and the information provided in this section is based on a review of boring logs for Redevelopment Block 31A presented in Appendix B. From the surface downward, the geologic units underlying Redevelopment Block 31A include Artificial Fill, Undifferentiated Upper Sand Deposits, Bay Mud Deposits, and Franciscan Complex bedrock (PRC, LFR, U&A 1996).

Beneath Redevelopment Block 31A, the Artificial Fill is about 4 to 12 feet thick. Bay Mud Deposits were only encountered in one boring at Redevelopment Block 31A, at about 5 feet bgs. Two borings were drilled at Redevelopment Block 31A: one to a maximum depth of 12 feet, and one to a maximum depth of 4 feet. Because of the shallow boring depths, the total thickness of the Artificial Fill, Bay Mud, and Undifferentiated Sedimentary Deposits is unknown (PRC, LFR, U&A 1996).

The hydrostratigraphy beneath Redevelopment Block 31A consists of an A-aquifer, an aquitard, and a B-aquifer. The hydrostratigraphy for this redevelopment block was based on surrounding redevelopment blocks because few deep borings and no monitoring wells were drilled in Redevelopment Block 31A. The A-aquifer consists of Artificial Fill and Undifferentiated Upper Sand Deposits. Groundwater flow in the A-aquifer at Redevelopment Block 31A historically

was likely to the northwest, toward a groundwater sink presumed to be caused by pumping at Pumping Station A (see Figure 3-9). No information on the B-aquifer was obtained from the borings within Redevelopment Block 31A. The B-aquifer is generally separated from the A-aquifer by the Bay Mud aquitard in surrounding redevelopment blocks. The general direction of groundwater flow for the B-aquifer is approximately southeast (see Figures 3-11 and 3-12).

4.3.1.3 Nature and Extent of Chemicals in Soil

This section summarizes the evaluation of the nature and extent of chemicals in soil within the boundary of Redevelopment Block 31A. The evaluation follows the approach for identifying chemicals and their spatial distribution described in Section 4.1.

4.3.1.3.1 Identification and Spatial Distribution of Chemicals in Soil

This section summarizes the chemicals identified in soil at Redevelopment Block 31A. Six samples were collected from two locations at Redevelopment Block 31A. Figure 4.3.1-1 shows the locations where soil samples were collected from Redevelopment Block 31A. Soil samples were analyzed for metals (including hexavalent chromium), VOCs, SVOCs, cyanide, pesticides, PCBs, and TPH.

Table 4.3.1-1 presents the summary statistics for chemicals that were detected at concentrations exceeding the residential and industrial soil screening criteria (shown in Table 4-1). Table 4.3.1-1 presents statistics for six surface (0 to 10 feet bgs) soil samples. No subsurface (deeper than 10 feet bgs) soil samples were collected. Appendix C includes the complete soil data used to generate the summary statistics tables for this redevelopment block.

The chemicals detected in soil are described below by analytical group: metals, SVOCs, and TPH.

Metals

Nineteen metals were detected in surface soil samples collected from 0 to 10 feet bgs. Of the 19 metals detected, 5 metals had one or more detected concentrations exceeding residential soil screening criteria. Three metals exceeded industrial soil screening criteria. The spatial distribution of metals in Redevelopment Block 31A is not indicative of a contiguous area of elevated concentrations (see Figure 4.3.1-2). As a result, the nature and extent of metals in soil at Redevelopment Block 31A is not discussed further in this section.

Semivolatile Organic Compounds

One SVOC (bis[2-ethylhexyl]phthalate) was detected above residential and industrial screening criterion in only one soil sample collected at Redevelopment Block 31A (see Figure 4.3.1-2). As a result, the extent of SVOCs in soil is not evaluated for Redevelopment Block 31A.

Total Petroleum Hydrocarbons

No TPH concentrations in soil exceeded screening criteria. As a result, the extent of TPH in soil is not evaluated for Redevelopment Block 31A.

4.3.1.3.2 Extent of Chemicals in Soil

The screening process identified no areas within Redevelopment Block 31A that would require evaluation of spatial trends of selected chemicals. However, the decision to address source areas in the FS Report will be based on the conclusions of the HHRA and the BERA.

4.3.1.4 Evaluation of Chemical Fate and Transport

Based on the analysis presented in Sections 4.3.1.3 and the absence of any groundwater wells in Redevelopment Block 31A, no chemicals were selected for their delineation of nature and extent in soil and groundwater at Redevelopment Block 31A. Therefore, no discussion of fate and transport is necessary.

4.3.2 Redevelopment Block 31B/36

This section summarizes the site characterization of Redevelopment Block 31B/36, including the site history (see Section 4.3.2.1), the geology and hydrogeology (see Section 4.3.2.2), the nature and extent of chemicals in soil (see Sections 4.3.2.3), the nature and extent of chemicals in groundwater (see Section 4.3.2.4), and the fate and transport of chemicals in each medium (see Section 4.3.2.5). The planned reuse for this block is industrial. No tenants are currently present on this redevelopment block.

4.3.2.1 Site History

Redevelopment Block 31B/36 is located in the northeastern portion of Parcel E. This redevelopment block includes portions of two IR sites: IR-36 North and IR-36 South. Site features within Redevelopment Block 31B/36 are shown on Figure 1-13. The subsections below discuss the historical uses of IR-36 North and IR-36 South.

4.3.2.1.1 IR-36 North

IR-36 North is located in the northern portion of Redevelopment Block 31B/36. IR-36 was previously part of Parcel D; however, it was transferred to Parcel E in 1997. Most of IR-36 North lies within Redevelopment Block 31B/36; the remainder of the site is within Redevelopment Blocks 31A and 43. IR-36 North covers about 9 acres and consists of the following site features within Redevelopment Block 31B/36:

- Building 400 (southern portion)
- Building 404A (southwestern portion)
- Building 405
- Utilities and an AST around Buildings 400, 404A, and 405

Building 400 (southern portion)

Building 400 was used by the Navy as a storehouse for decommissioned ship parts and other equipment. During a 1988 survey, chemicals inventoried at this building included acetylene and oil containing PCBs (HLA 1990b). Building 400 was formerly leased to Bay Storage Distribution Company and occupied by commercial businesses, including Just Born Antiques, Golden Gate Plumbing, and Bay Storage (Navy 2005b). The tenants no longer occupy Building 400, and it is currently vacant (Tetra Tech 2007a).

Building 404A (southwestern portion)

Building 404A was a covered parking area, which was used by the Navy to store miscellaneous parts and equipment (PRC 1995). In June 2005, Building 404A was leased to Mina Metals and the U.S. Department of Justice (Navy 2005b). As of June 2007, Building 404A was vacant (Tetra Tech 2007a).

Building 405

Building 405 was reportedly used by the Navy to store solvents, oil, gasoline, diesel fuel, formaldehyde, and chlorine (HLA 1994d). The building was subsequently used by a company to store compost materials (PRC, LFR, and U&A 1996). As of June 2005, Building 405 was not leased (Navy 2005b). One railroad spur is located north of Building 405 that may be a potential source of chemical releases to soil.

Utilities and an AST Around Buildings 400, 404A, and 405

A former 220-gallon AST was confirmed to have been removed at Building 405 (Tetra Tech 2007b). The sanitary sewer and storm drain lines run near the eastern and western boundary of IR-36 North (see Figure 3-1). Porous backfill surrounding these lines, and possibly the lines themselves, may influence the direction of groundwater flow on the western side of IR-36 North (HLA 1995).

4.3.2.1.2 IR-36 South

IR-36 South is located in the southern portion of Redevelopment Block 31B/36, just south of IR-36 North. IR-36 South covers about 12 acres and consists of the following site features within Redevelopment Block 31B/36:

- Building 406
- Building 413
- Building 414
- Utilities and infrastructure around Buildings 406, 413, and 414

Building 406

Building 406 has been used for various industrial operations and as a Navy supply storehouse over the years (HLA 1994c). In the 1950s, the Navy used the northwest portion of Building 406 for preservation and packaging operations (HLA 1995). Navy records indicated that the original concrete floor inside the building subsided significantly toward the southeast. As a result, a new concrete floor was constructed on top of the old one. These old and new floors were separated by a gravel fill layer (HLA 1995). According to Navy records, equipment in the northwest portion of Building 406 was used to degrease parts before packaging them for shipping (HLA 1995). This equipment included a degreasing machine; solvent, acid, neutralizer, water rinse, plastic dip, cold preservation dip, and hot preservation dip tanks; and miscellaneous packaging equipment. Trichloroethane was identified as a solvent used during operations in this building (HLA 1995); however, based on the chemicals observed in soil and groundwater, it is more likely that trichloroethene (TCE) was used to degrease parts. It is suspected that solvents were released to soil and groundwater through floor drains and associated underground piping and by spills on the floor of Building 406 (HLA 1995). Waste oil was stored in drums outside of Building 406, and waste oil from several of the drums reportedly leaked onto the ground surface (PRC, LFR, and U&A 1996).

As of 1995, the eastern portion of Building 406 was used as an automobile repair garage for office space and storage by civilian tenants (PRC, LFR, and U&A 1996). As of June 2005, Building 406 is no longer leased (Navy 2005b), but it is used by the Navy to store low-level radioactive waste from various removal actions (Tetra Tech EC, Inc. [TtECI] 2005b).

A soil vapor extraction (SVE) treatability system consisting of 3 SVE wells and 15 vapor monitoring wells was installed inside and immediately northwest of Building 406. The SVE system operated for 3 months beginning in May 2001 (IT Corporation 2002). TCE was found to be the predominant VOC in vadose zone soil. The cumulative VOC mass removed during the test performance period was estimated at 7 pounds, with over 90 percent of the VOC mass attributed to TCE (IT Corporation 2002).

Building 413

Building 413 was used by the Navy as a supply storehouse. Waste oil was stored in drums in Building 413. During a 1988 survey, several damaged waste oil drums were inventoried inside this building (HLA 1990b). In 1995, this building was used as office space by the U.S. Postal Service (PRC, LFR, and U&A 1996). In June 2005, Building 413 was leased to American Van Lines (Navy 2005b). As of June 2007, Building 413 was vacant (Tetra Tech 2007a).

Building 414

Building 414 was used as a public works facility and furniture storehouse (HLA 1994b). The building has an exposed soil floor and was used to store drums filled with investigation-derived waste collected during SI and RI field activities (PRC, LFR, and U&A 1996). As of June 2005, Building 414 was not leased (Navy 2005b).

Utilities and Infrastructure Around Buildings 406, 413, and 414

Sanitary sewer and storm drain lines run near the eastern and western boundary of IR-36 South (see Figure 3-1). Porous backfill surrounding these lines, and possibly the lines themselves, may influence the direction of groundwater flow on the western side of IR-36 South (HLA 1995). No USTs, vaults, or ASTs were identified at IR-36 South (HLA 1994c).

Two railroad spurs are located within IR-36 South: one spur runs north of Building 406 and the second spur runs south of Building 406. The railroad spurs are potential sources of chemical releases to soil.

A large oil-stained area between Buildings 413 and 414 was identified during the SI; waste oil was reportedly stored in drums at this location (HLA 1994c). This area is a potential source of releases to soil.

4.3.2.2 *Geology and Hydrogeology*

This section briefly discusses the geological and hydrogeological features beneath Redevelopment Block 31B/36. A full description of geology and hydrogeology at Parcel E is presented in Sections 3.4 and 3.5, respectively.

Asphalt and concrete paving and concrete building foundations cover most of Redevelopment Block 31B/36. Parcel-wide cross sections shown on Figures 3-4, 3-5, and 3-6 do not traverse this redevelopment block, and the information provided in this section is based on a review of boring logs for Redevelopment Block 31B/36 provided in Appendix B. From the surface downward, the geologic units underlying Redevelopment Block 31B/36 include Artificial Fill, Bay Mud Deposits, Undifferentiated Sedimentary Deposits, and Franciscan Complex bedrock. The Artificial Fill overlies native sediments at all locations in Redevelopment Block 31B/36,

except where bedrock is close to the ground surface beneath Buildings 406, 413, and 414. In this area, Artificial Fill directly overlies bedrock.

Beneath Redevelopment Block 31B/36, Artificial Fill ranges from about 5 to 50 feet thick. Bay Mud deposits lie below the Artificial Fill and are about 1 to 43 feet thick. Bay Mud deposits underlie most of Redevelopment Block 31B/36. Bay Mud Deposits and Undifferentiated Sedimentary Deposits are absent beneath Building 406 where bedrock is as shallow as 9 feet bgs. Undifferentiated Sedimentary Deposits consisting of poorly graded sand are about 0 to 23 feet thick and underlie Bay Mud deposits. Beneath Redevelopment Block 31B/36, the depth to bedrock ranges from about 9 to 75 feet bgs.

The hydrostratigraphy beneath Redevelopment Block 31B/36 consists of an A-aquifer, an aquitard, and a B-aquifer. Shallow weathered bedrock in direct contact with artificial fill is considered part of the A-aquifer. Based on groundwater elevations measured in A-aquifer wells, the depth to groundwater ranges from an average low of 3.2 to an average high of 9.4 feet bgs throughout Redevelopment Block 31B/36. Groundwater flow in the A-aquifer at Redevelopment Block 31B/36 is generally north-northwest, with some irregularities where the bedrock is close to the ground surface. The B-aquifer is separated from the A-aquifer by the Bay Mud aquitard and low-permeable bedrock and is absent where bedrock is close to the ground surface beneath Buildings 406, 413, and 414. Beneath Redevelopment Block 31B/36, the A- and B-aquifers are not in direct hydraulic communication. The general direction of groundwater flow for the B-aquifer is approximately southeast (see Figures 3-11 and 3-12).

4.3.2.3 *Nature and Extent of Chemicals in Soil*

This section summarizes the evaluation of the nature and extent of chemicals in soil at Redevelopment Block 31B/36. The evaluation follows the approach for identifying chemicals and their spatial distribution described in Section 4.1.

4.3.2.3.1 *Identification and Spatial Distribution of Chemicals in Soil*

This section summarizes the chemicals identified in soil at Redevelopment Block 31B/36. Approximately 339 soil samples were collected at Redevelopment Block 31B/36. Figure 4.3.2-1 shows the locations where soil samples were collected from Redevelopment Block 31B/36. Soil samples were analyzed for metals (including hexavalent chromium), VOCs, SVOCs (including PAHs), cyanide, pesticides, PCBs, and TPH.

Tables 4.3.2-1 and 4.3.2-2 present the summary statistics for chemicals that were detected at concentrations exceeding residential and industrial soil screening criteria. Table 4.3.2-1 presents statistics for 218 surface (0 to 10 feet bgs) soil samples; Table 4.3.2-2 presents statistics for 120 subsurface (deeper than 10 feet bgs) soil samples. Appendix C includes the complete soil data set used to generate the summary statistics tables for this redevelopment block.

The chemicals detected in soil are described below by analytical group: metals (including chromium VI), VOCs, SVOCs (including PAHs), cyanide, pesticides, PCBs, and TPH.

Metals

The risk due to metals is primarily in the upper 10 feet of soil (see Appendix I); therefore, this discussion focuses on the data for metals in surface soil samples. Twenty metals were detected in soil samples collected from the surface to a depth of 10 feet bgs. Of the 20 metals detected, 11 metals had one or more detected concentrations exceeding residential soil screening criteria. Only two metals had one or more detected concentrations exceeding industrial screening criteria.

The lateral extent of elevated concentrations of metals was evaluated to identify areas in Redevelopment Block 31B/36 exceeding Parcel E industrial screening criteria in soil. Figure 4.3.2-2 shows the sampling locations where concentrations of metals in soil from 0 to 10 feet bgs exceeded industrial screening criteria and presents the elevated concentrations at each location. Concentrations of metals exceeded the screening criteria in soil at contiguous sampling locations north and south of Building 413. Concentrations also exceeded screening criteria in isolated sampling locations within Redevelopment Block 31B/36; however, the spatial distribution does not indicate a source area.

The potential source of metals north and south of Building 413 includes historical waste oil drum storage inside the building. Several damaged waste oil drums were inventoried inside the building (HLA 1990b). A large oil-stained area south of Building 413 was identified during the SI; this area is a potential source of releases to soil.

Volatile Organic Compounds

Twenty-one VOCs were detected in samples collected from surface soil (0 to 10 feet bgs); however, only three VOCs were detected at concentrations exceeding Parcel E residential and industrial screening criteria (see Table 4.3.2-1). Twelve VOCs were detected in samples collected from subsurface soil (deeper than 10 feet bgs); however, only two concentrations exceeded Parcel E residential screening criteria (see Table 4.3.2-2). Results for VOC samples exceeded the industrial screening criteria in six samples in three isolated locations. TCE was detected in four samples. Although the isolated concentration of TCE does not represent a source area in soil, TCE is discussed further below because it was also detected in groundwater. Figure 4.3.2-3 shows the sampling locations where concentrations of VOCs in soil from 0 to 10 feet bgs exceeded screening criteria and presents the elevated concentrations at each location.

The potential source of TCE at Redevelopment Block 31B/36 is the degreasing operations that occurred in the northwest corner of Building 406. Concentrations of TCE also exceeded Parcel E residential and industrial screening criterion at sampling locations beneath the northwest corner of Building 406; samples were collected in November 2000 during installation of the SVE system. The SVE system operated for 2 months beginning in May 2001 (IT Corporation 2002). No soil samples were collected and analyzed for TCE in this area after operation of the SVE system was halted.

Semivolatile Organic Compounds

Twenty-four SVOCs were detected in one or more soil samples collected from the ground surface to 10 feet bgs. However, only 9 of the 24 SVOCs were detected at concentrations exceeding Parcel E residential screening criteria, and 3 of the 9 SVOCs exceeded Parcel E industrial screening criteria (see Table 4.3.2-1). Twenty SVOCs were detected in soil samples collected from deeper than 10 feet bgs, four of which exceeded Parcel E residential screening criteria, and only one exceeded the industrial screening criterion (see Table 4.3.2-2).

The lateral extent of elevated concentrations of SVOCs was evaluated to identify areas within Redevelopment Block 31B/36 where SVOCs exceeded Parcel E industrial soil screening criteria in soils from 0 to 10 feet bgs. Figure 4.3.2-4 shows the sampling locations where SVOCs exceeded Parcel E industrial screening criteria and presents the elevated concentrations at each location. SVOC concentrations exceeded industrial screening criteria at three isolated locations, as shown on Figure 4.3.2-4, at the following areas:

- West of Building 406
- North of Building 413
- South of Building 413

None of these isolated locations indicates a source of SVOCs to soil. Many samples were collected in the vicinity of the exceedance areas and throughout Redevelopment Block 31B/36; however, no samples other than those from locations mentioned above exceeded Parcel E industrial soil screening criteria.

The potential sources or activities that may have resulted in SVOC contamination include degreasing operations in the northwestern portion of Building 406. Equipment used in these operations included a degreasing machine; and dip tanks for solvents, acids, neutralizer, rinse water, plastics, and cold and hot preservation. Solvents may have been released to soil and groundwater through floor drains and associated underground piping and by spills on the floor of Building 406 (HLA 1995). Waste oil was stored in drums in Building 413. Several damaged waste oil drums were inventoried inside the building (HLA 1990b). A large oil-stained area south of Building 413 was identified during the SI; this area is a potential source of releases to soil.

Cyanide

Cyanide was detected in 1 out of 66 soil samples collected from 0 to 10 feet bgs; the detected concentration did not exceed the Parcel E residential or industrial screening criterion. Cyanide was not detected in any of the six soil samples collected deeper than 10 feet bgs. As a result, the nature and extent of cyanide in soil at Redevelopment Block 31B/36 is not discussed further in this section.

Pesticides

Twenty pesticides were detected in soil samples collected from 0 to 10 feet bgs; the detected concentrations did not exceed Parcel E residential or industrial screening criteria. Eight pesticides were detected in soil samples collected deeper than 10 feet bgs; only one detected concentration for pesticides exceeded the Parcel E residential screening criterion. As a result, the nature and extent of pesticides in soil at Redevelopment Block 31B/36 is not discussed further in this section.

Polychlorinated Biphenyls

One PCB, Aroclor-1260, was detected in soil samples collected from 0 to 10 feet bgs (see Table 4.3.2-1). No PCBs were detected in soil samples collected from deeper than 10 feet bgs. Aroclor-1260 was detected in less than 2 percent of samples collected (3 of 177 samples), and the maximum concentration did not exceed the Parcel E residential criteria by more than one order of magnitude. No concentrations of PCBs were found that exceeded industrial screening criteria. As a result, the nature and extent of PCBs in soil at Redevelopment Block 31B/36 is not discussed further in this section.

Total Petroleum Hydrocarbons

TPH concentrations exceeded the soil source screening criterion at six sampling locations; five of the locations were collocated with CERCLA chemicals. No free product was detected in monitoring wells within Redevelopment Block 31B/36 (Tetra Tech 2002c).

The lateral extent of elevated concentrations of TTPH was evaluated to identify areas within Redevelopment Block 31B/36 where TTPH exceeded the soil source screening criterion in soil. Figure 4.3.2-5 shows the sampling locations where concentrations of TTPH exceeded the screening criteria and presents the maximum detected concentrations at each location. Concentrations of TTPH exceeded the screening criterion in soil at contiguous sampling locations north and south of Building 413. The elevated concentrations of TTPH are collocated with elevated concentrations of metals and SVOCs.

The potential sources or activities that may have resulted in TTPH contamination north and south of Building 413 include storage of waste oil drums inside the building. Several damaged waste oil drums were inventoried inside the building (HLA 1990b). In addition, a large oil-stained area south of building 413 was identified during the SI; this area is a potential source of releases to soil.

4.3.2.3.2 Extent of Chemicals in Soil

Three areas were identified within Redevelopment Block 31B/36 where concentrations of chemicals in soil at contiguous sampling locations exceeded Parcel E industrial screening criteria:

- North of Building 413: metals, SVOCs, and TPH (see Figures 4.3.2-2, 4.3.2-4, and 4.3.2-5)
- South of Building 413: metals, SVOCs, and TPH (see Figures 4.3.2-2, 4.3.2-4, and 4.3.2-5)
- West and Northwest of Building 406: SVOCs and VOCs (see Figure 4.3.2-3)

The area north of Building 413 coincides with the railroad spur. Activities related to loading or unloading railroad cars may have resulted in releases of metals, SVOCs, and TPH. It is assumed that Building 413 bounds the area to the south. The estimated size of the area is 200 feet (east-west) by 70 feet (north-south). The depth to groundwater in this area is 9.3 feet bgs.

The area south of Building 413 coincides with the oil-stained area between Buildings 413 and 414, where waste oil was stored in drums (HLA 1994c). The oil-stained area indicates a release and leaks from stored waste oil drums may have resulted in elevated concentrations of metals and TPH. The estimated size of the area is 100 feet (east-west) by 80 feet (north-south). The depth to groundwater in this area is 7.5 feet bgs.

The area west and northwest of Building 406 coincides with the degreasing operations that took place in the northwest corner of Building 406. The estimated size of the area is 130 feet (east-west) by 100 feet (north-south). The depth to groundwater in this area is 7 feet bgs.

4.3.2.4 Nature and Extent of Chemicals in Groundwater

This section summarizes the evaluation of the nature and extent of chemicals detected in groundwater samples collected from monitoring wells associated with Redevelopment Block 31B/36. Figure 4.3.2-6 shows the locations of the groundwater monitoring wells associated with Redevelopment Block 31B/36 where groundwater samples were collected for this evaluation.

Tables 4.3.2-3 and 4.3.2-4 present the summary statistics for chemicals that were detected in the A-aquifer and the B-aquifer, respectively. No bedrock water-bearing zone wells are associated with Redevelopment Block 31B/36. Table 4.3.2-3 presents statistics for data from 12 A-aquifer wells; Table 4.3.2-4 presents statistics for data from 3 B-aquifer wells. Chemicals that were retained for evaluation based on consideration of the factors described in Section 4.1.2.2 are shown in bold font in these tables. Appendix D includes the complete groundwater data set for this redevelopment block.

4.3.2.4.1 Chemicals in A-Aquifer Groundwater

Twelve A-aquifer wells are associated with Redevelopment Block 31B/36 (see Figure 4.3.2-6), including 2 wells that are not physically located within the redevelopment block. Groundwater samples collected from the A-aquifer wells were analyzed for metals (including hexavalent chromium), VOCs, SVOCs, cyanide, pesticides, PCBs, and TPH. SVOCs, cyanide, and PCBs

were not detected in any groundwater samples collected from A-aquifer wells associated with Redevelopment Block 31B/36; therefore, these chemicals are not discussed further in this section.

The chemicals that were detected in groundwater samples collected from the A-aquifer are evaluated below by the following analytical groups: metals, VOCs, pesticides, and TPH.

Metals

Samples collected from the A-aquifer wells associated with Redevelopment Block 31B/36 were analyzed for metals during one or more rounds of sampling; 22 metals were detected. Of the 22 metals detected, only copper exceeded the appropriate screening criterion (surface water criteria, or HGALs if greater than surface water criteria) listed in Table 4.3.2-3. The spatial and temporal distribution of copper in groundwater is discussed below.

Copper exceeded its surface water criterion (3.1 micrograms per liter [$\mu\text{g/L}$]) and its HGAL (28.04 $\mu\text{g/L}$) in only one groundwater sample, collected from PA36MW04A in 1996, with a concentration of 38.5 $\mu\text{g/L}$. This well is located approximately 1,500 feet from the Bay. Copper was detected at concentrations less than 8 $\mu\text{g/L}$ in two subsequent samples collected from well PA36MW04A (in March 2001 and July 2002) and was not detected at a reporting limit of 8 $\mu\text{g/L}$ in the most recent sample in the RI data set collected from this well (in September 2002). As a result, metals in A-aquifer groundwater at Redevelopment Block 31B/36 are not discussed further in this section.

Volatile Organic Compounds

Samples collected from the A-aquifer wells associated with Redevelopment Block 31B/36 were analyzed for VOCs during one or more rounds of sampling; 15 VOCs were detected. Of the 15 VOCs detected, 5 exceeded at least one of the appropriate screening criteria (vapor intrusion and surface water criteria): 1,2-dichloroethene (-DCE) (total), 1,4-dichlorobenzene (-DCB), tetrachloroethene (PCE), TCE, and vinyl chloride. The spatial and temporal distributions of these five VOCs are discussed below.

- 1,2-DCE (total) exceeded its vapor intrusion criterion (210 $\mu\text{g/L}$) in 3 of 29 groundwater samples. The three exceedances were reported in samples collected from well IR36MW125A in January, March, and April 1996, ranging from 330 to 580 $\mu\text{g/L}$. The 1,2-DCE (total) analysis was replaced by the isomer-specific analysis (cis- and trans-1,2-DCE) in groundwater samples collected after June 1996. Both cis- and trans-1,2-DCE have not exceeded their respective screening criteria in samples collected from any of the A-aquifer wells for Redevelopment Block 31B/36.
- 1,4-DCB exceeded its vapor intrusion criterion (2.1 $\mu\text{g/L}$) in 1 of 55 groundwater samples. The single exceedance (7.8 $\mu\text{g/L}$) was reported in a sample collected from well PA36MW04A in July 2002. 1,4-DCB was not detected in any of the four preceding samples collected from this well (from 1993 to 2001) or the subsequent sample collected from this well in September 2002.

- PCE exceeded its vapor intrusion criterion (0.54 µg/L) in 1 of 54 groundwater samples. The single exceedance (17 µg/L) was reported in a sample collected from well PA36MW04A in July 2002. PCE was not detected in groundwater samples collected from any wells during the four preceding sampling events and one subsequent sampling event.
- TCE was the most frequently detected VOC (51 percent of the samples) and was also detected at the highest concentrations. TCE exceeded its vapor intrusion criterion (2.9 µg/L) in 4 of the 12 A-aquifer wells. The table below summarizes the analytical results for TCE for these four A-aquifer wells, with the vapor intrusion criterion exceedances highlighted in bold.

Sampling Location	Sample Date	TCE (µg/L)	Qualifier
IR36MW125A	01/24/1996	1,000	J
	03/15/1996	490	
	04/26/1996	860	
	03/06/2001	55	
	07/18/2002	130	
	09/18/2002	12	
	11/29/2004	110	
IR36MW127A	01/25/1996	0.5	U
	03/15/1996	0.5	U
	04/29/1996	0.5	U
	03/26/2001	1	U
	06/28/2002	5.9	
	09/09/2002	0.5	U
	06/16/2004	0.5	U
	09/14/2004	0.5	U
IR36MW128A	12/02/2004	0.5	U
	01/24/1996	2	J
	03/14/1996	2	
	04/22/1996	2	
	03/06/2001	3	
	07/19/2002	0.61	
	09/10/2002	0.13	J
	06/16/2004	0.17	J
	09/16/2004	0.5	U
PA36MW04A	12/02/2004	0.5	U
	02/05/1993	6	J
	02/07/1996	5	
	03/11/1996	1	
	03/20/2001	1	U
	07/01/2002	0.55	
	9/11/2002	0.13	J

Notes:

J Estimated concentration
U Nondetect

The highest concentrations of TCE were detected in groundwater samples collected from well IR36MW125A. Concentrations have decreased significantly in this well from a maximum of 1,000 µg/L in 1996 to a maximum of 110 µg/L in 2004. This is the only well with sample results that consistently exceeded the A-aquifer screening criterion after 2001, when SVE system operated in this area for 2 months.

The presence of TCE in groundwater is likely related to the use of degreasing equipment and the storage of solvents in the northwestern portion of Building 406. The 2004 TCE groundwater plume in Redevelopment Block 31B/36, shown on Figure 4-4, was defined by the extent of TCE based on the 2004 quarterly groundwater monitoring data (see Table 4-4). The 2004 analytical results indicated that the plume was limited to an area around one well (IR36MW125A), and beneath the northwestern corner of Building 406. Grab groundwater data collected in 1994 (see the results for IR-36 South in Appendix K) indicate that the 2004 TCE groundwater plume may cover a larger area. However, the size of the 2004 TCE plume is unlikely to be larger than shown on Figure 4-4, because (1) the TCE concentrations in grab groundwater samples could be biased high because of high turbidity associated with the samples; (2) the SVE system operated in 2001 removed significant amount of TCE in the source area (IT Corporation 2002); and (3) concentrations of TCE measured in monitoring wells bounding the plume were consistently nondetected or below the screening criterion. Analytical results from grab groundwater samples are not included in the RI dataset but are presented in Appendix K.

Based on requests from the regulatory agencies, a qualitative screen of groundwater data was conducted from 2004 to 2007 for TCE in this redevelopment block. Recent data show that the concentration of TCE in well IR36MW125A had increased to a maximum of 4,800 µg/L for a sample collected in June 2006. Additional data will be collected from this well as part of the ongoing basewide monitoring program. The FS will include an evaluation of data obtained since December of 2004 update the extent of the 2004 TCE groundwater plume and develop appropriate remedial action alternatives (see Section 4.3.2.5).

- Vinyl chloride exceeded its vapor intrusion criterion (0.028 µg/L) in 4 of 54 groundwater samples. The four exceedances were reported in samples collected from well PA36MW04A in February and March 1996 (4 and 2 µg/L, respectively) and well IR36MW125A in March and April 1996 (22 and 25 µg/L, respectively). Vinyl chloride was not detected in groundwater samples collected from any wells during subsequent sampling events in 2001, 2002, and 2004.

Only TCE in A-aquifer groundwater at Redevelopment Block 31B/36 is discussed further in this section.

Pesticides

Samples collected from the A-aquifer wells associated with Redevelopment Block 31B/36 were analyzed for pesticides during one or more rounds of sampling; 12 pesticides were detected (see Table 4.3.2-3). All but one of the detections were qualified as estimated because the concentrations were below the PQL. Of the 12 pesticides detected, 6 pesticides exhibited concentrations exceeding surface water criteria (4,4'-dichlorodiphenyltrichloroethane [-DDT], endosulfan II, endrin, gamma-chlordane, heptachlor, and methoxychlor). The exceedances occurred in three wells (IR36MW17A, PA36MW04A, and PA36MW07A) in samples collected in February 1993, July 2002, and September 2002. Heptachlor was detected twice in samples collected from well PA36MW04A in July and September 2002, at concentrations of 0.017 and 0.0088 µg/L. The other five pesticides were detected only once. Based on the relatively few samples with exceedances of surface water criteria, the low levels that were detected (all detections except one were estimated quantities), and the historical nature of these detections, the nature and extent of the individual pesticides is not discussed further.

Total Petroleum Hydrocarbons

Samples collected from the A-aquifer wells associated with Redevelopment Block 31B/36 were analyzed for TPH products during one or more rounds of sampling. TPH-g, TPH-d, and TPH-mo were detected in groundwater samples collected from three, five, and eight A-aquifer wells, respectively. The maximum concentrations detected of each TPH range varied from 570 to 910 µg/L (see Table 4.3.2-3). These maximum concentrations as well as the total TPH concentration were all less than the TPH screening criteria for groundwater. As a result, TPH products in A-aquifer groundwater at Redevelopment Block 31B/36 are not discussed further in this section.

4.3.2.4.2 Chemicals in B-Aquifer Groundwater

Three B-aquifer wells are located within Redevelopment Block 31B/36 (see Figure 4.3.2-6). Groundwater samples collected from the B-aquifer wells were analyzed for metals, VOCs, SVOCs, pesticides, PCBs, and TPH. SVOCs, pesticides, and PCBs were not detected in any groundwater samples collected from the B-aquifer wells associated with Redevelopment Block 31B/36; therefore, these chemicals are not discussed further in this section. Table 4.3.2-4 presents the summary statistics for chemicals detected in samples collected from the B-aquifer wells.

The chemicals that were detected in groundwater samples collected from the B-aquifer are evaluated below by the following analytical groups: metals, VOCs, and TPH.

Metals

Samples collected from the B-aquifer wells associated with Redevelopment Block 31B/36 were analyzed for metals during one or more rounds of sampling; 18 metals were detected. Groundwater samples collected from B-aquifer wells after 1996 were not analyzed for metals. Of the 18 metals detected, 5 metals (arsenic, copper, manganese, silver, and thallium) exhibited concentrations exceeding one or more screening criteria (see Table 4.3.2-4). The spatial and temporal distribution of these five metals is discussed below.

- Arsenic exceeded its domestic use criterion (0.007 µg/L) in three of nine groundwater samples. The three exceedances were reported in samples collected from wells IR36MW123B and IR36MW129B in March and April 1996. Detected concentrations of arsenic ranged from 1.4 to 2.8 µg/L. Arsenic was not detected in subsequent samples collected from these wells in May and June 1996.
- Copper exceeded its surface water criterion (3.1 µg/L) in one of nine groundwater samples. The single exceedance (8.2 µg/L) was reported in a sample collected from well IR36MW123B in June 1996. This well is located approximately 1,500 feet from the Bay. Copper was not detected above its surface water criterion in the two preceding samples collected from this well.
- Manganese exceeded its domestic use criterion (880 µg/L) in six of nine groundwater samples. The six exceedances were reported in samples collected from wells IR36MW120B and IR36MW129B in March through June 1996. Manganese concentrations in samples collected from well IR36MW120B ranged from 918 to 956 µg/L, while manganese concentrations at well IR36MW129B ranged from 1,990 to 2,160 µg/L.
- Silver exceeded its surface water criterion (0.38 µg/L) in one of nine groundwater samples. The single exceedance (0.68 µg/L) was reported in a sample collected from well IR36MW123B in March 1996. This well is located approximately 1,500 feet from the Bay. Silver was not detected in the two subsequent samples collected from this well in April and June 1996.
- Thallium exceeded its MCL (2 µg/L) in one of nine groundwater samples. The single exceedance (4 µg/L) was reported in a sample collected from well IR36MW1239B in March 1996. Thallium was not detected in the two subsequent samples collected from this well in April and May 1996.

Metals in B-aquifer groundwater at Redevelopment Block 31B/36 are not discussed further in this section.

Volatile Organic Compounds

Samples collected from the B-aquifer wells associated with Redevelopment Block 31B/36 were analyzed for VOCs during one or more rounds of sampling; 10 VOCs were detected. Of the 10 VOCs detected, 4 VOCs (1,4-DCB, PCE, TCE, and vinyl chloride) exhibited concentrations

exceeding one or more screening criteria (see Table 4.3.2-4). The spatial and temporal distribution of these four VOCs is discussed below.

- 1,4-DCB exceeded its domestic use criterion (0.3 µg/L) in 3 of 27 samples. The exceedances were reported in samples collected from all three B-aquifer wells in June and July 2002, ranging from 1.6 to 17 µg/L. 1,4-DCB was not detected in any of the preceding (March and April 1996) or subsequent samples (September 2002 through December 2004) collected from any of these wells.
- PCE exceeded its domestic use criterion (0.1 µg/L) in 3 of 27 samples. The exceedances were reported in samples collected from all three B-aquifer wells in June and July 2002, ranging from 2.9 to 41 µg/L. Before 2002, analytical results for groundwater samples did not indicate the presence of PCE in B-aquifer wells at Redevelopment Block 31B/36 (see Appendix D). PCE was not detected at any of the B-aquifer wells during the three subsequent groundwater sampling events in 2004.
- TCE exceeded its domestic use criterion (1.4 µg/L) in 1 of 27 samples. The single exceedance (1.5 µg/L) was reported in a sample collected from well IR36MW120B in June 2002. TCE was not detected in the four preceding (March 1996 through March 2001) or four subsequent samples (September 2002 through December 2004) collected from this well.
- Vinyl chloride exceeded its domestic use criterion (0.032 µg/L) in 1 of 27 samples. The single exceedance (1.3 µg/L) was reported in a sample collected from well IR36MW123B in September 2004. Before 2004, analytical results for groundwater samples did not indicate the presence of vinyl chloride in any of the B-aquifer wells at Redevelopment Block 31B/36 (see Appendix D). During November 2004, vinyl chloride was not detected in samples collected from the B-aquifer wells.

VOCs in B-aquifer groundwater at Redevelopment Block 31B/36 are not discussed further in this section.

Total Petroleum Hydrocarbons

Samples collected from the B-aquifer wells associated with Redevelopment Block 31B/36 were analyzed for TPH products during one or more rounds of sampling. TPH-g and TPH-mo were detected in groundwater samples from two of the three B-aquifer wells. The maximum concentrations detected were 33 µg/L for TPH-g and 67 µg/L for TPH-mo. The total TPH concentrations were less than TPH screening criteria for groundwater (see Section 4.1). As a result, TPH products in B-aquifer groundwater at Redevelopment Block 31B/36 are not discussed further in this section.

4.3.2.4.3 Extent of Chemicals in Groundwater

The screening process identified one area (Monitoring Well IR36MW125A) within Redevelopment Block 31B/36 where concentrations of TCE in A-aquifer groundwater consistently exceeded Parcel E screening criteria (see Figure 4-4 and Table 4-4).

The presence of TCE in A-aquifer groundwater is related to the historical use of degreasing equipment and the storage of solvents in the northwestern portion of Building 406.

The screening process identified no chemicals within Redevelopment Block 31B/36 where concentrations of chemicals in B-aquifer groundwater consistently exceeded Parcel E screening criteria.

4.3.2.5 Evaluation of Chemical Fate and Transport

As described in Sections 4.3.2.3 and 4.3.2.4, four areas were identified where soil sampling results exceeded Parcel E soil screening criteria and one well was identified where groundwater sampling results exceeded Parcel E groundwater screening criteria in Redevelopment Block 31B/36. Chemicals identified in areas exceeding Parcel E screening criteria in soil are metals (arsenic and lead); VOCs (TCE); SVOCs; and TPH. Only TCE was identified as exceeding screening criteria for groundwater. The persistence and mobility of these chemicals in soil and groundwater is discussed below.

Metals

The mobility of arsenic and lead are highly dependant on soil pH and infiltration of water. Soil pH within Redevelopment Block 31B/36 ranges from 5.5 to 10. However, only two of 151 pH measurements were below 7.0 (including values of 5.5 and 6.9, see Appendix C). Average pH calculated as described in Section 4.3.2.5 is 7.6. The predominantly above-neutral pH values measured in the vadose zone soil samples indicate that site conditions do not favor leaching of these metals into groundwater (see Appendix H). Although arsenic may be somewhat mobile in the basic soils, its concentrations in groundwater have not exceeded Parcel E screening criteria. Concentrations of lead in groundwater also have not exceeded Parcel E screening criteria. Therefore, the migration of arsenic and lead from the vadose zone soils to groundwater appears to be limited.

Volatile Organic Compounds

TCE in the vadose zone soil northwest corner of Building 406 was partially addressed through the use of a SVE treatability study from May through July 2001. The SVE treatability study reportedly removed most TCE from soil (IT Corporation 2002), thereby reducing the likelihood for TCE to continue migrating from soil to groundwater or entering the building through volatilization. However, no soil samples were collected after operation of the SVE system.

Therefore, the potential for migration of residual TCE from soil to air and groundwater at Building 406 remains.

TCE continued to be detected in samples from one groundwater well (IR36MW125A) at concentrations exceeding Parcel E screening criteria; the TCE concentrations appeared to be declining from a historical maximum of 1,000 µg/L (1996) to 110 µg/L (2004). However, since 2004, the TCE concentrations appear to have increased in single well IR36MW125A to 4,800 µg/L in 2006. The presence of TCE daughter products in this well such as cis-1,2-DCE and vinyl chloride indicates that degradation of TCE is occurring. Additional data will be collected from this well as part of the ongoing basewide monitoring program. The FS will include an evaluation of data obtained since December of 2004 to evaluate whether a rebound of TCE in well IR36MW125A continues and develop appropriate remedial action alternatives.

Semivolatile Organic Compounds

SVOCs present in soils identified for further evaluation include benzo(a)pyrene and benzo(b)fluoranthene. Both of these compounds are strongly sorbed to soils, have low solubilities in water, and low volatilization potential (see Appendix H). The potential for these chemicals to migrate from the vadose zone into groundwater is relatively low.

Total Petroleum Hydrocarbons

The detections of TPH in soil that were noted for further evaluation are associated with TPH-diesel and -motor oil range. Petroleum hydrocarbons of diesel and motor oil ranges are known to strongly sorb to soil and have low to moderate solubilities in water. It is expected that migration of petroleum hydrocarbons from soil to groundwater and migration with groundwater would be limited.

4.3.3 Redevelopment Block 40

This section summarizes the site characterization of Redevelopment Block 40, including the site history (see Section 4.3.3.1), the geology and hydrogeology (see Section 4.3.3.2), the nature and extent of chemicals in soil (see Sections 4.3.3.3), the nature and extent of chemicals in groundwater (see Section 4.3.3.4), and the fate and transport of chemicals in each medium (see Section 4.3.3.5). The planned reuse for this block is industrial. No tenants are currently present on this redevelopment block.

4.3.3.1 Site History

Redevelopment Block 40 is located in the central portion of Parcel E. This block includes portions of three IR sites: IR-14, IR-38, and IR-39. Site features within Redevelopment Block 40 are shown on Figure 1-13. The subsections below discuss the historical uses of each IR site within the boundaries of Redevelopment Block 40.

4.3.3.1.1 IR-14

The northernmost portion of IR-14 is located in the southern portion of Redevelopment Block 40. IR-14 lies primarily within Redevelopment Block EMI-1, the remainder lies within Redevelopment Blocks 40 and 41 (see Figure 1-13). IR-14 includes Buildings 506 and 529, which were occupied by NRD L in the early 1950s. Building 506 was used as laboratories and was located within the southeast portion of Redevelopment Block 40. Building 529, located adjacent to the southeast boundary of Redevelopment Block 40, was used to store radioisotopes and housed the Cockcroft-Walton generator. The exact construction and demolition dates of these buildings are unknown. However, review of aerial photographs indicated that the buildings were likely constructed prior to 1950 and demolished sometime in the 1970s (PRC 1996c). Operations in Building 506 were moved to Building 815 or newer facilities in 1955; most areas in Building 506 were decontaminated at that time.

Between December 1969 and January 1970, all of the former NRD L buildings were inspected and cleared by the Atomic Energy Commission (AEC) for unrestricted use. To confirm that residual radioactive contamination associated with former NRD L operations is not present, a radiation survey of surface soil in the vicinity of the former NRD L buildings was performed during the Phase III radiation investigation (Tetra Tech, LFR, and U&A 1997). Residual radiological contamination was not detected at the ground surface during this survey; however, an anomaly was detected near Buildings 506 and 529. The New World Technology Phase V investigation found contaminated underground piping in this area. Remediation of these radiologically impacted areas was recommended in the Final Historical Radiological Assessment (RASO 2004).

Oily Liquid Waste Disposal Area

The oily liquid waste disposal area, for the purposes of this RI Report, is in the northwestern half of IR-11/14/15. The oily liquid waste disposal area includes Triple A Sites 6 and 7. In 1946, this area consisted of housing, a movie theater, a dental clinic, a ship's dispensary, and the women officers' club (HLA 1993). Review of aerial photographs indicated that all buildings were torn down by 1970 (PRC 1996c). Triple A allegedly disposed of oily waste and salvage waste into a gully reportedly in an open area between Buildings 505 and 521 (San Francisco District Attorney [SFDA] 1986). The gully was reportedly filled with sandblast waste at a later date. The location of the gully is not apparent from existing surface conditions or from available aerial photographs (HLA 1990c). In addition, Triple A reportedly disposed of oil and other wastes mixed with water onto the ground; drums, transformers, and chemical canisters were also reportedly dumped at the site (Triple A Sites 6 and 7) (SFDA 1986). The oily wastes either were pumped by hose directly from former Tank S-505 in IR-02 Southeast or were pumped from a vacuum truck onto the ground (SFDA 1986). In 1988, no indications of surface disposal of hazardous wastes were apparent (HLA 1989b).

4.3.3.1.2 IR-38

The northwestern portion of the IR-38 lies within Redevelopment Block 40 and was previously identified as being within Parcel D (transferred to Parcel E in February 2005) (see Figure 1-13). This portion of IR-38 covers about 2.2 acres and includes Building 500 and former UST S-508. Building 500 was the former Chief Petty Officer Barracks. During an inspection of the building, paint chips were observed in exposed soil surrounding the outside of the building. Reportedly, one electrical transformer associated with this building was removed; however, the date of removal is unknown (HLA 1994c).

UST S-508 (750-gallon capacity) was located east of the southern portion of Building 500. The tank was installed in the mid-1940s and was used to store heating oil for a boiler in Building 500. UST S-508 and its associated product piping were removed on July 25, 1991, during Phase I of the HPS UST program (PRC, LFR, and U&A 1996). During removal of UST S-508, numerous holes in the tank were observed. Field observations and analytical results from soil samples collected during the UST closure indicated a release of petroleum hydrocarbons to surrounding soil. This area has been designated for removal under the TPH program.

4.3.3.1.3 IR-39

The southeast portion of IR-39 is located in Blocks 43 and 40 and consists of Building 505 and a large vacant area west of Building 505 (see Figure 1-13). The southeastern portion of IR-39 was originally part of Parcel D (transferred to Parcel E in February 2005). The southeastern portion of IR-39 covers about 6.5 acres. Building 505 was the former Navy Exchange, which consisted of a bowling alley, gymnasium, cafeteria, and a general recreation center. During a survey conducted in 1988, a 55-gallon drum with unknown contents, three electrical transformers, and asbestos were noted in this building; their removal date is unknown (HLA 1994b).

4.3.3.2 *Geology and Hydrogeology*

This section briefly discusses the geological and hydrogeological features beneath Redevelopment Block 40. A full description of geology and hydrogeology at Parcel E is presented in Section 3.4 and 3.5, respectively.

The surface of Redevelopment Block 40 consists of approximately 50 percent paving and 50 percent ruderal vegetation. Parcel-wide cross sections shown on Figures 3-4, 3-5, and 3-6 do not traverse this redevelopment block, and the information provided in this section is based on a review of boring logs for Redevelopment Block 40 provided in Appendix B. From the surface downward, the geologic units at Redevelopment Block 40 consist of Artificial Fill, Undifferentiated Upper Sand Deposits, Bay Mud Deposits, Undifferentiated Sedimentary Deposits, and Franciscan Complex bedrock.

The Artificial Fill at Redevelopment Block 40 consists predominantly of dark gray, green, and brown sand and gravel mixtures with varying proportions of clay and silt, with occasional serpentinite cobble and boulder fill. Artificial Fill at this redevelopment block ranges from about 5 to 33 feet thick. The Undifferentiated Upper Sand Deposits consist of loose, poorly graded sand with shell fragments and are approximately 0 to 10 feet thick. No borings at Redevelopment Block 40 were deep enough to penetrate through the Bay Mud deposits. In two monitoring wells at Redevelopment Block 40, Bay Mud deposits lay directly under the Artificial Fill at 24 to 33 feet bgs. No borings were deep enough to encounter Undifferentiated Sedimentary Deposits or bedrock. The bedrock surface, which appears to dip from the northwest toward the south/southeast toward a saddle between the northwest corner of the redevelopment block and Shag Rock to the southeast, is estimated to occur from approximately 20 to 75 feet below msl at Redevelopment Block 40 (see Figure 3-8).

The hydrostratigraphy beneath Redevelopment Block 40 consists of an A-aquifer, an aquitard, and a B-aquifer. Based on average groundwater elevations measured in A-aquifer wells, the depth to groundwater in the A-aquifer ranges from 5.4 to 7.5 feet bgs throughout this redevelopment block. Groundwater flow in the A-aquifer at Redevelopment Block 40 is generally toward the west (see Figures 3-9 and 3-10). The B-aquifer is separated from the A-aquifer by the Bay Mud aquitard. Beneath Redevelopment Block 40, the A- and B-aquifers are not in direct hydraulic communication. The general direction of groundwater flow for the B-aquifer is approximately southeast (see Figures 3-11 and 3-12).

4.3.3.3 *Nature and Extent of Chemicals in Soil*

This section summarizes the evaluation of the nature and extent of chemicals in soil at Redevelopment Block 40. The evaluation follows the approach for identifying chemicals and their spatial distribution described in Section 4.1.

4.3.3.3.1 *Identification and Spatial Distribution of Chemicals in Soil*

This section summarizes the chemicals identified in soil at Redevelopment Block 40. Approximately 68 soil samples were collected at Redevelopment Block 40. Figure 4.3.3-1 shows the locations where soil samples were collected from Redevelopment Block 40. Soil samples were analyzed for metals (including hexavalent chromium), VOCs, SVOCs, cyanide, pesticides, PCBs, TPH, and radioactive materials. Radiological data are being addressed as part of the radiological program for HPS; therefore, these data are not discussed further in this Revised Parcel E RI Report.

Tables 4.3.3-1 and 4.3.3-2 present the summary statistics for chemicals that were detected at concentrations exceeding residential soil screening. Tables 4.3.3-1 presents statistics for 51 surface (0 to 10 feet bgs) soil samples; Tables 4.3.3-2 presents statistics for 17 subsurface (deeper than 10 feet bgs) soil samples. Appendix C includes the complete soil data set used to generate the summary statistics tables for this redevelopment block.

The chemicals detected in soil are described below by analytical group: metals, VOCs, SVOCs, cyanide, pesticides, PCBs, and TPH.

Metals

The risk due to metals is primarily in the upper 10 feet of soil (see Appendix I); therefore, this discussion focuses on the data for metals in surface soil samples. Twenty-four metals were detected in soil samples collected from the surface to a depth of 10 feet bgs. Of the 24 metals detected, 11 metals had one or more detected concentrations exceeding residential soil screening criteria. Arsenic exceeded the residential criterion and HPAL at two isolated locations. Arsenic exceeded industrial soil screening criteria at two isolated locations. As a result, the nature and extent of metals in soil at Redevelopment Block 40 is not discussed further in this section.

Volatile Organic Compounds

Seven VOCs were detected in soil samples collected from the surface to 10 feet bgs; however, none were detected at concentrations exceeding Parcel E residential or industrial screening criteria (see Appendix C). Two VOCs were detected in soil samples collected deeper than 10 feet bgs; however, none were detected at concentrations exceeding Parcel E residential or industrial screening criteria (see Appendix C). As a result, the nature and extent of VOCs in soil at Redevelopment Block 40 is not discussed further in this section.

Semivolatile Organic Compounds

Sixteen SVOCs were detected in one or more soil samples collected from the surface to 10 feet bgs. Only two SVOCs were detected at concentrations exceeding Parcel E residential screening criteria, and only one SVOC exceeded the industrial screening criteria (see Table 4.3.3-1). Two SVOCs were also detected in soil samples collected deeper than 10 feet bgs at concentrations exceeding Parcel E residential screening criteria (see Table 4.3.3-2). The industrial screening criteria were exceeded at only one isolated location. As a result, the nature and extent of SVOCs in soil at Redevelopment Block 40 is not discussed further in this section.

Cyanide

Cyanide was detected in 4 out of 14 soil samples collected from the surface to 10 feet bgs; the detected concentrations did not exceed Parcel E residential or industrial screening criteria (see Appendix C). Cyanide was not detected in six soil samples collected deeper than 10 feet bgs (see Appendix C). As a result, the nature and extent of cyanide in soil at Redevelopment Block 40 is not discussed further in this section.

Pesticides

Seven pesticides were detected in soil samples collected from the surface to 10 feet bgs; the detected concentrations did not exceed Parcel E residential or industrial screening criteria (see Appendix C). Three pesticides were detected in soil samples collected deeper than 10 feet bgs; the detected concentrations did not exceed Parcel E residential or industrial screening criteria (see Appendix C). As a result, the nature and extent of pesticides in soil at Redevelopment Block 40 is not discussed further in this section.

Polychlorinated Biphenyls

Two PCBs (Aroclor-1254 and Aroclor-1260) were detected at location IR14SS05 from 0 to 10 feet bgs in concentrations exceeding industrial screening criteria (see Table 4.3.3-1). No other PCB exceedances of industrial screening criteria occurred in Redevelopment Block 40. In addition, no PCBs were detected in samples collected from greater than 10 feet bgs. As a result, the nature and extent of PCBs in soil at Redevelopment Block 40 is not discussed further in this section.

Total Petroleum Hydrocarbons

TPH concentrations did not exceed the soil source screening criterion at Redevelopment Block 40, except for one exceedance in a sample collected under the UST program in 1991. Additionally, no free product was detected in monitoring wells within this redevelopment block (Tetra Tech 2002c). As a result, the nature and extent of TPH in soil at Redevelopment Block 40 is not discussed further in this section.

4.3.3.2 Extent of Chemicals in Soil

The screening process indicated no contiguous soil sampling locations requiring evaluation of spatial trends within Redevelopment Block 40.

4.3.3.4 Nature and Extent of Chemicals in Groundwater

This section summarizes the evaluation of the nature and extent of chemicals detected in groundwater samples collected from monitoring wells associated with Redevelopment Block 40. Figure 4.3.3-5 shows the locations of the groundwater monitoring wells located in Redevelopment Block 40 where groundwater samples were collected for this evaluation.

Table 4.3.3-3 presents the summary statistics for chemicals that were detected in samples collected from the A-aquifer wells. No B-aquifer wells or bedrock water-bearing zone wells are associated with Redevelopment Block 40. Chemicals that were retained for evaluation based on consideration of the factors described in Section 4.1.2.2 are shown in bold font in this table. Appendix D includes the complete groundwater data set for this redevelopment block.

4.3.3.4.1 Chemicals in A-Aquifer Groundwater

Four A-aquifer wells are associated with Redevelopment Block 40 (see Figure 4.3.3-5). Groundwater samples collected from the A-aquifer wells were analyzed for metals (including hexavalent chromium), VOCs, SVOCs, cyanide, pesticides, PCBs, and TPH. VOCs, SVOCs, cyanide, pesticides, and PCBs were not detected in any groundwater samples collected from A-aquifer wells associated with Redevelopment Block 40; therefore, these chemicals are not discussed further in this section.

The chemicals that were detected in groundwater samples collected from the A-aquifer are evaluated below by analytical group: metals and TPH.

Metals

Samples collected from the A-aquifer wells associated with Redevelopment Block 40 were analyzed for metals in one or more rounds of sampling; 20 metals were detected. Of the 20 metals detected, 2 metals (cadmium and lead) exceeded one or more of the appropriate screening criteria (surface water criteria, or HGALs if greater than surface water criteria) listed in Table 4.3.3-3. The spatial and temporal distributions of cadmium and lead are discussed below.

- Cadmium exceeded its surface water criterion (8.8 µg/L) and its HGAL (5.08 µg/L) in only one groundwater sample, collected from IR14MW10A in 1991, with a concentration of 12.6 µg/L. This well is located approximately 1,000 feet from the Bay. Cadmium was not detected at concentrations above 1.7 µg/L in any of the five subsequent samples collected from well IR14MW10A in 1992, 2001, and 2002.
- Lead exceeded its surface water criterion (5.6 µg/L) and its HGAL (14.44 µg/L) in only one groundwater sample. The single exceedance was reported in a sample, collected from IR14MW10A in 1992, with a concentration of 18 µg/L. Lead was not detected at concentrations above 13 µg/L in the duplicate sample. Additionally, lead was not detected at concentrations above 2 µg/L in subsequent samples collected from IR14MW10A in 2001, 2002, and 2002.

Cadmium and lead in A-aquifer groundwater at Redevelopment Block 40 are not discussed further in this section.

Total Petroleum Hydrocarbons

Samples collected from the A-aquifer wells associated with Redevelopment Block 40 were analyzed for TPH during one or more rounds of sampling. TPH-d, TPH-g, and TPH-mo were detected in groundwater samples from three of the four A-aquifer wells. The maximum concentrations detected were 76 µg/L for TPH-d, 29 µg/L for TPH-g, and 970 µg/L for TPH-mo. The total TPH concentrations were less than TPH screening criteria for groundwater. As a result, TPH products in A-aquifer groundwater at Redevelopment Block 40 are not discussed further in this section.

4.3.3.4.2 *Extent of Chemicals in Groundwater*

The screening process identified no wells associated with Redevelopment Block 40 where concentrations of chemicals in A-aquifer groundwater consistently exceeded Parcel E screening criteria.

4.3.3.5 *Evaluation of Chemical Fate and Transport*

Based on the analysis presented in Sections 4.3.3.3 and 4.3.3.4, no chemicals were selected for delineation of their nature and extent in soil and groundwater at Redevelopment Block 40. Therefore, no discussion of fate and transport is necessary.

4.3.4 *Redevelopment Block 41*

This section summarizes the site characterization of Redevelopment Block 41, including the site history (see Section 4.3.4.1), the geology and hydrogeology (see Section 4.3.4.2), the nature and extent of chemicals in soil (see Section 4.3.4.3), the nature and extent of chemicals in groundwater (see Section 4.3.4.4), and the fate and transport of chemicals in each medium (see Section 4.3.4.5). The planned reuse for this block is industrial. No tenants are currently present on this redevelopment block, except the San Francisco Police Department in Building 606.

4.3.4.1 *Site History*

Redevelopment Block 41 is located in the east-central portion of Parcel E. This redevelopment block includes all of IR-08 and a portion of IR-38. Site features within Redevelopment Block 41 are shown on Figure 1-13. The subsections below discuss the historical uses of IR-08 and IR-38 within the boundaries of Redevelopment Block 41.

4.3.4.1.1 *IR-08*

IR-08 is located in the eastern portion of Redevelopment Block 41. IR-08 was previously considered to be part of Parcel D; however, it was transferred to Parcel E in February 2005. IR-08 covers about 0.5 acre and consists of the following site features within Redevelopment Block 41:

- Southeast portion of former Building 503
- Southeast portion of existing Building 606
- Utilities around former Buildings 503 and 508 and existing Building 606

Southeast Portion of Former Building 503

Building 503 was the base laundry facility. The facility was operated from (at least) 1948 to 1974. Building 503 was demolished sometime between 1977 and 1979 (PRC 1996g).

Southeast Portion of Existing Building 606

Building 606 was constructed in 1989 on the site of former Building 503, for use as the HPS military postal facility. As of 2005, Building 606 was occupied by the San Francisco Police Department (Navy 2005b).

Utilities Around Former Buildings 503 and 508 and Existing Building 606

Utilities within IR-08 include the following:

- Storm line traversing IR-08 and 3 associated catch basins. The catch basins were designed to flow into dry wells that discharged to subsurface soils and groundwater. During heaving rain events, the overflow from these dry wells entered the storm sewer and discharged to the Bay.
- Steam lines were located in the area of former Building 503. During construction activities in the early 1980s, a steam line was damaged near Building 503 and oily wastes were reported to have leaked from the line.
- Electrical transformers were used and stored in several areas within IR-08. Electrical transformers containing PCB oil were reportedly stored on a transformer pad, located on the south side of the former Building 503. Two transformers containing PCB oil were also located on power poles, north and south of the site. The transformers were removed from service by American Environmental Management Corporation and the Navy Public Works Department in 1988 (HLA 1992b).
- Two oil grease traps and a 21,000-gallon fuel oil AST used for the former Building 503 laundry facility, reportedly were located south and west of former Building 503. The grease traps and associated floor drains and the AST were removed during construction activities for Building 606. An abandoned pump house, used to pump saltwater to charge the fire-hydrant system, is located immediately northeast of the PCB spill area. The date when this pump house was abandoned is unknown (HLA 1992b).

4.3.4.1.2 IR-38

The southeastern portion of IR-38 is located in the southern portion of Redevelopment Block 41. IR-38 covers about 2 acres and consists of the following site features within Redevelopment Block 41:

- Former Building 507
- Former Building 508

Former Building 507

Building 507 was used as the NRDL biological laboratory (PRC 1996c). The building and its foundation no longer exist. The exact construction and demolition dates of the buildings are unknown; however, it was likely constructed prior to 1950 and demolished between 1977 and 1979 (PRC 1996c). The building was located south of existing Building 606 (see Figure 4.3.4-1).

Operations in Building 507 were moved to Building 815 sometime in the late 1950s, and most areas of Building 507 were decontaminated at that time (NRDL 1969). In December 1969, Building 507 was inspected and cleared by the AEC for unrestricted use (NRDL 1969). To confirm that residual radiological contamination associated with former operations in Building 507 was not present at IR-38, surface soil in the vicinity of the former building was surveyed during the Phase III radiation investigation. Radiological contamination was not detected at IR-38 during this survey (Tetra Tech, LFR, and U&A 1997).

Former Building 508

Building 508 was used as the NRDL health physics office (PRC 1996c). The building and its foundation no longer exist. The exact construction and demolition dates of the buildings are unknown; however, it was likely constructed prior to 1950 and demolished sometime between 1977 and 1979 (PRC 1996c). Building 508 was located south of existing Building 606 (see Figure 4.3.4-1).

Operations in Building 508 were moved to Building 815 sometime in the late 1950s, and most areas of Building 508 did not require decontamination at that time (RASO 1995). In December 1969, Building 508 was inspected and cleared by the AEC for unrestricted use (NRDL 1969). To confirm that residual radiological contamination associated with former operations in Building 508 was not present at IR-38, surface soil in the vicinity of the former building was surveyed during the Phase III radiation investigation. Radiological contamination was not detected at IR-38 during this survey (Tetra Tech, LFR, and U&A 1997).

4.3.4.2 Geology and Hydrogeology

This section briefly discusses the geological and hydrogeological features beneath Redevelopment Block 41. A full description of geology and hydrogeology at Parcel E is presented in Sections 3.4 and 3.5, respectively.

Most of Redevelopment Block 41 is covered by asphalt and concrete pavement and the concrete foundation of Building 606. The southern portion of this redevelopment block is covered by ruderal vegetation. Parcel-wide cross sections shown on Figures 3-4, 3-5, and 3-6 do not traverse this redevelopment block, and the information provided in this section is based on a review of boring logs for Redevelopment Block 41 provided in Appendix B. From the surface downward, the geologic units at Redevelopment Block 41 consist of Artificial Fill, Bay Mud Deposits, Undifferentiated Sedimentary Deposits, Bay Mud Deposits, Undifferentiated Sedimentary Deposits, and Franciscan Complex bedrock.

The Artificial Fill at Redevelopment Block 41 consists predominantly of clayey gravel, sand and gravel, gravelly clay, and occasional serpentinite boulder fill (particularly in the southeast corner of IR-08), ranging from 8 to 31 feet thick. Undifferentiated Upper Sand Deposits locally overlie Bay Mud and underlie Artificial Fill, ranging from 6 to 15 feet thick. Bay Mud Deposits consist of clay with abundant shell fragments and intermittent silt. The Bay Mud Deposits range from 10 to 59 feet thick. The surface of the Bay Mud Deposits forms a swale that trends to the east-northeast and is as deep as 50 to 60 feet in the southwest portion of the redevelopment block. No borings penetrated into the Undifferentiated Sedimentary Deposits or bedrock at Redevelopment Block 41; therefore, the thickness and depth of these formations is unknown. However, the bedrock surface beneath this redevelopment block consists of a saddle between two bedrock highs (see Figure 3-8). The saddle trends west-northwest to east-southeast and is greater than 50 feet deep.

The hydrostratigraphy beneath Redevelopment Block 41 consists of an A-aquifer, an aquitard, and a B-aquifer. Based on average groundwater elevations measured in A-aquifer wells, the depth to groundwater in the A-aquifer ranges from 4.5 to 7.7 feet bgs throughout Redevelopment Block 41. Groundwater flow in the A-aquifer at Redevelopment Block 41 is generally west or southwest (see Figure 3-9). The B-aquifer is separated from the A-aquifer by the Bay Mud aquitard (see Figure 3-7). Beneath Redevelopment Block 41, the A- and B-aquifers are not in direct hydraulic communication. The general direction of groundwater flow for the B-aquifer is approximately southeast (see Figure 3-11).

4.3.4.3 *Nature and Extent of Chemicals in Soil*

This section summarizes the evaluation of the nature and extent of chemicals in soil at Redevelopment Block 41. The evaluation follows the approach for identifying chemicals and their spatial distribution described in Section 4.1.

4.3.4.3.1 *Identification and Spatial Distribution of Chemicals in Soil*

This section summarizes chemicals identified in soil at Redevelopment Block 41. Approximately 364 soil samples were collected at Redevelopment Block 41. Figure 4.3.4-1 shows the locations where soil samples were collected from Redevelopment Block 41. Soil samples were analyzed for metals (including hexavalent chromium), VOCs, SVOCs, (including PAHs), cyanide, pesticides, PCBs, TPH, and radioactive materials. Radiological data are being

addressed as part of the radiological program for HPS; therefore, these data are not discussed further in this section.

Tables 4.3.4-1 and 4.3.4-2 present the summary statistics for chemicals that were detected at concentrations exceeding residential and industrial soil screening criteria. Table 4.3.4-1 presents the statistics for 178 surface (0 to 10 feet bgs) soil samples; Table 4.3.4-2 presents statistics for 186 subsurface (deeper than 10 feet bgs) soil samples. Appendix C includes the complete soil data set used to generate the summary statistics tables for this redevelopment block.

The chemicals detected in soil are described below by analytical group: metals, VOCs, SVOCs, pesticides, PCBs, and TPH.

Metals

The risk due to metals is primarily in the upper 10 feet of soil (see Appendix I); therefore, this discussion focuses on the data for metals in surface soil samples. Twenty-three metals were detected in soil samples collected from the surface to a depth of 10 feet bgs. Of the 23 metals detected, 8 metals were detected at concentrations exceeding residential soil screening criteria (see Figure 4.3.4-2). Only arsenic exceeded the residential criterion by more than one order of magnitude; however, a limited number of detected concentrations exceeded the HPAL. Arsenic exceeded industrial soil screening criteria in two isolated locations. As a result, the nature and extent of metals in soil at Redevelopment Block 41 is not discussed further in this section.

Volatile Organic Compounds

Fifteen VOCs were detected in soil samples collected from the surface to 10 feet bgs; however, no VOCs were detected at concentrations exceeding Parcel E residential or industrial screening criteria (see Appendix C). Fifteen VOCs were detected in soil samples collected deeper than 10 feet bgs; however, no VOCs exceeded Parcel E residential or industrial screening criteria (see Appendix C). As a result, the nature and extent of VOCs in soil at Redevelopment Block 41 is not discussed further in this section.

Semivolatile Organic Compounds

Eighteen SVOCs were detected in one or more soil samples collected from the surface to 10 feet bgs; however, only three SVOCs were detected at concentrations exceeding Parcel E residential screening criteria (see Table 4.3.4-1). None of the SVOC concentrations exceeded the residential criteria by more than one order of magnitude. One SVOC was detected at one isolated location at a concentration that exceeded industrial soil screening criteria (see Figure 4.3.4-3). No SVOCs were detected at a depth greater than 10 feet bgs. As a result, the nature and extent of SVOCs in soil at Redevelopment Block 41 is not discussed further in this section.

Pesticides

Six pesticides were detected in soil samples collected from the surface to 10 feet bgs; however, only two pesticides exceeded Parcel E residential screening criteria (see Table 4.3.4-1). None of these pesticides exceeded residential criteria by more than one order of magnitude. Pesticide concentrations did not exceed industrial soil screening criteria. Four pesticides were detected in soil samples collected deeper than 10 feet bgs. None of the analytical results from these deep soil samples exceeded Parcel E residential or industrial screening criteria for pesticides. As a result, the nature and extent of pesticides in soil at Redevelopment Block 41 is not discussed further in this section.

Polychlorinated Biphenyls

Two PCBs were detected in soil samples collected from the surface to 10 feet bgs. Only one PCB, Aroclor-1260, was detected at concentrations exceeding the Parcel E residential and industrial screening criterion (see Table 4.3.4-1). The maximum Aroclor-1260 concentration did not exceed the residential criteria by more than one order of magnitude. PCBs were detected in soil samples collected deeper than 10 feet bgs. Only Aroclor-1260 was detected at concentrations exceeding residential criterion by more than one order of magnitude (see Table 4.3.4-2). Based on the limited number of detections exceeding industrial soil screening considerations (see Section 4.1.1.2), the nature and extent of PCBs in soil at Redevelopment Block 41 is not discussed further in this section.

Total Petroleum Hydrocarbons

TPH concentrations did not exceed the soil source screening criterion in soil samples collected at Redevelopment Block 41, and no free product was detected in monitoring wells within this block (Tetra Tech 2002c). As a result, the nature and extent of TPH in soil at Redevelopment Block 41 is not discussed further in this section.

4.3.4.3.2 Extent of Chemicals in Soil

The screening process identified no contiguous soil sampling locations exceeding Parcel E industrial screening criteria within Redevelopment Block 41.

4.3.4.4 *Nature and Extent of Chemicals in Groundwater*

This section summarizes the evaluation of the nature and extent of chemicals detected in groundwater samples collected from monitoring wells associated with Redevelopment Block 41. Figure 4.3.4-4 shows the locations the groundwater monitoring wells associated with Redevelopment Block 41 where groundwater samples were collected for this evaluation.

Table 4.3.4-3 presents the summary statistics for chemicals that were detected in the A-aquifer wells associated with Redevelopment Block 41. No B-aquifer wells or bedrock water-bearing zone wells are associated with Redevelopment Block 41. Chemicals that were retained for evaluation based on consideration of the factors described in Section 4.1.2.2 are shaded and shown in bold font in this table. Appendix D includes the complete groundwater data set for this redevelopment block.

4.3.4.4.1 Chemicals in A-Aquifer Groundwater

Eight A-aquifer wells are associated with Redevelopment Block 41 (see Figure 4.3.4-4), including four wells that are not physically located within the redevelopment block and one well, IR08MW42A, that was previously decommissioned. Groundwater samples collected from the A-aquifer wells were analyzed for metals (including hexavalent chromium), VOCs, SVOCs, cyanide, dioxins and furans, pesticides, PCBs, and TPH. Cyanide and pesticides were not detected in any groundwater samples collected from A-aquifer wells; therefore, these chemicals are not discussed further in this section.

The chemicals that were detected in groundwater samples collected from the A-aquifer are evaluated below by analytical group: metals, VOCs, SVOCs, dioxins/furans, PCBs, and TPH.

Metals

Samples collected from the A-aquifer wells associated with Redevelopment Block 41 were analyzed for metals during one or more rounds of sampling; 22 metals were detected. Of the 22 metals detected, only copper and mercury exceeded the appropriate screening criterion (surface water criteria, or HGALs if greater than surface water criteria) listed in Table 4.3.4-3. The spatial and temporal distributions of these two metals are discussed below.

- Copper exceeded its surface water criterion (3.1 µg/L) and its HGAL (28.04 µg/L) in two groundwater samples, collected from wells IR08MW37A and IR08MW38A in July 1990, with concentrations of 49.2 and 54.2 µg/L, respectively. These wells are located over 1,100 feet from the Bay. Copper was not detected at concentrations above 9 µg/L in the three subsequent samples collected from each of these wells in January, July, and December 1991.
- Mercury exceeded its surface water criterion (0.025 µg/L) and its HGAL (0.6 µg/L) in only one groundwater sample, collected from well IR08MW37A in January 1991, with a concentration of 0.8 µg/L. This well is located approximately 1,100 feet from the Bay. Mercury was not detected in the two preceding samples collected from this well in July 1990 and January 1991, or the three subsequent samples collected from this well from July 1991 through May 1994. Mercury was detected below the HGAL in the most recent sample in the RI data set collected from this well (August 1994), with a concentration of 0.16 µg/L.

As a result, copper and mercury in A-aquifer groundwater at Redevelopment Block 41 are not discussed further in this section.

Volatile Organic Compounds

Samples collected from the eight A-aquifer wells associated with Redevelopment Block 41 were analyzed for VOCs in one or more rounds of sampling; five VOCs were detected. Of the five VOCs detected, none exceeded any of the appropriate screening criteria listed in Table 4.3.4-3. As a result, VOCs in A-aquifer groundwater at Redevelopment Block 41 are not discussed further in this section.

Semivolatile Organic Compounds

Samples collected from the eight A-aquifer wells associated with Redevelopment Block 41 were analyzed for SVOCs in one or more rounds of sampling; seven SVOCs were detected. Of the seven SVOCs detected, none exceeded the appropriate screening criteria (surface water criteria) listed in Table 4.3.4-3. As a result, SVOCs in A-aquifer groundwater at Redevelopment Block 41 are not discussed further in this section.

Dioxins and Furans

Samples collected from the eight A-aquifer wells associated with Redevelopment Block 41 were analyzed for dioxins and furans in one or more rounds of sampling; one furan was detected (dibenzofuran). Neither of the two detections of dibenzofuran exceeded the appropriate screening criteria (surface water criteria) listed in Table 4.3.4-3. As a result, dioxins in A-aquifer groundwater at Redevelopment Block 41 are not discussed further in this section.

Polychlorinated Biphenyls

Samples collected from the eight A-aquifer wells associated with Redevelopment Block 41 were analyzed for PCBs during one or more rounds of sampling; one PCB (Aroclor-1260) was detected in 2 of the 51 samples. Both detections of Aroclor-1260 exceeded the appropriate screening criteria (surface water criteria) listed in Table 4.3.4-3. The surface water criterion for Aroclor-1260 (0.03 µg/L) is less than the reporting limits (0.5 µg/L and 1 µg/L). Aroclor-1260 was detected in samples collected from well IR08MW42A in October and December 1991. The October 1991 detection (4 µg/L) was qualified as estimated, because it was below the PQL, and the December 1991 detection was at the reporting limit of 1 µg/L. PCBs were not detected in any of the four subsequent samples collected from this well from November 1993 through August 1994. This decommissioned well was located approximately 1,100 feet from the Bay. As a result, PCBs are not discussed further for the A-aquifer in Redevelopment Block 41.

Total Petroleum Hydrocarbons

Samples collected from the eight A-aquifer wells associated with Redevelopment Block 41 were analyzed for TPH products in one or more rounds of sampling. TPH-d and TPH-g were detected in groundwater samples from one A-aquifer well, and TPH-mo was detected in groundwater samples from three A-aquifer wells. The maximum concentrations detected of each TPH range varied from 36 to 970 µg/L (see Table 4.3.4-3). These maximum concentrations were all less than the TPH screening criteria for groundwater (as shown in Table 4-1). As a result, TPH products in A-aquifer groundwater at Redevelopment Block 41 are not discussed further in this section.

4.3.4.4.2 Extent of Chemicals in Groundwater

The screening process identified no chemicals within Redevelopment Block 41 where concentrations in A-aquifer groundwater consistently exceeded Parcel E screening criteria.

4.3.4.5 Evaluation of Chemical Fate and Transport

Based on the analysis presented in Sections 4.3.4.3 and 4.3.4.4, no chemicals were selected for delineation of their nature and extent in soil and groundwater at Redevelopment Block 41. Therefore, no discussion of fate and transport is necessary.

4.3.5 Redevelopment Block 43

This section summarizes the site characterization of Redevelopment Block 43, including the site history (see Section 4.3.5.1), the geology and hydrogeology (see Section 4.3.5.2), the nature and extent of chemicals in soil (see Section 4.3.5.3), the nature and extent of chemicals in groundwater (see Section 4.3.5.4), and the fate and transport of chemicals in each medium (see Section 4.3.5.5). The planned reuse for this block is industrial. No tenants are currently present on this redevelopment block.

4.3.5.1 Site History

Redevelopment Block 43 is located in the central portion of Parcel E. This redevelopment block includes portions of six IR sites: IR-05, IR-13, IR-36 North, IR-36 South, IR-36 West, and IR-39. Site features within Redevelopment Block 43 are shown on Figure 1-13. The subsections below discuss the historical uses of the six IR sites present in the Redevelopment Block 43 area.

4.3.5.1.1 IR-05

IR-05 is located in the northwestern portion of Redevelopment Block 43 and is entirely within Redevelopment Block 43. IR-05 covers approximately 4.3 acres, and no buildings are present at this site. From 1946 to 1974, the Navy stored used electrical transformers of various sizes in a

mostly unpaved open yard about 400 feet north of Building 704 (Tetra Tech, LFR, and U&A 1997). Three concrete pads are located along the northern boundary of the site. The exact location and dimensions of the storage yard are uncertain. It was estimated that six to eight transformers per year were stored at the site over a period of approximately 30 years (EMCON 1987a). These transformers were suspected of containing PCB oils that may have leaked onto the soil, which is the potential contaminant source at IR-05. During their occupancy of HPS, Triple A fenced an area in the western portion of IR-05 at the intersection of 6th and "R" streets (Tetra Tech, LFR, and U&A 1997). The use of this fenced area is unknown, and the fencing has been removed.

Two TPH corrective action areas (CAA), CAA15 and CAA16, were excavated in 2004. Table A-3 in Appendix A provides more information on TPH CAAs.

4.3.5.1.2 IR-13

IR-13 is located in the southern portion of Redevelopment Block 43 and is entirely within Redevelopment Block 43. IR-13 covers approximately 3.1 acres and consists of PA-13 and Triple A Sites 5 and 15. IR-13 was used as a storage yard before construction of the commissary (Building 803) in 1948 or 1949. The commissary was demolished sometime between 1979 and 1981. Nearby Building 524 was used as a commissary storehouse and also was demolished.

During Triple A's occupancy, drums containing liquids and an oily soil pile were allegedly stored at IR-13 (Triple A Site 5) and sandblast waste was allegedly stored on the foundation of the former Building 524 (Triple A Site 15).

Concrete foundation slabs from former Buildings 524 and 803 were converted to decontamination facilities that are used for activities related to environmental work at HPS. Both decontamination facilities are fenced and locked. Miscellaneous debris (hoses and wood) piles that were present on the northwest edge of IR-13 were removed sometime after 1993. In 1988, three electrical transformers were observed near the corner of Manseau and "I" Streets, north of the former commissary (ERM-West 1988). These transformers were subsequently removed; however, the date of removal is unknown.

4.3.5.1.3 IR-36 North

IR-36 North extends into the northeastern portion of Redevelopment Block 43. Most of IR-36 North lies within Redevelopment Block 31B/36; the remainder of the site is within Redevelopment Blocks 31A and 43. IR-36 North covers approximately 9 acres. The only feature within Redevelopment Block 43 is the area west of Building 405, which consists of a vacant lot and railroad tracks (see Figure 4.3.5-1). This area was used for disposal of construction debris, including cement blocks, scrap metal, and wood (HLA 1994c).

4.3.5.1.4 IR-36 South

IR-36 South extends into the central portion of the eastern border of Redevelopment Block 43. Most of IR-36 South is located within Redevelopment Block 31B/36. The portion of IR-36 South located within Redevelopment Block 43 consists of the sanitary sewer and storm drain lines running beneath "I" Street, near the western boundary of IR-36 South.

4.3.5.1.5 IR-36 West

All of IR-36 West is located within the central portion of Redevelopment Block 43. IR-36 West covers approximately 7 acres, and consists of the following site features within Redevelopment Block 43:

- Buildings 371 and 704
- Area around Buildings 371 and 704
- Building 709 and associated USTs

Buildings 371 and 704

Building 371 was used by the Navy as a storehouse for miscellaneous equipment (HLA 1990a). In June 2005, Building 371 was used by S and W Productions (Navy 2005b). Building 704 was used by the Navy as an automotive repair shop. Materials used or stored at Building 704 included motor and hydraulic oils, waste oil, diesel fuel, solvents, acids, and electrolyte solution (in batteries) (HLA 1994c). Building 704 also was used by Wagner Construction Company for equipment repair and storage (PRC 1994b). As of June 2007, Buildings 371 and 704 were vacant (Tetra Tech 2007a).

Area Around Buildings 371 and 704

The area around Buildings 371 and 704 was used by Wagner Construction Company as a storage yard for equipment and vehicles (PRC 1994b). During the Parcel D RI investigation, it was noted that puddled surface water with a petroleum hydrocarbon sheen and several stained soil areas were present in this storage yard (HLA 1994c). Large closed containers and subgrade storage sumps containing diesel fuel, waste oil, hydraulic oil, and solvent were stored by Wagner Construction Company in this yard (HLA 1994c). Information on the removal of these containers and sumps has not been identified.

Building 709 and Associated USTs

Building 709 was formerly a service station and has been abandoned. Five USTs (S-711 through S-715) were located adjacent to Building 709. These tanks were removed in August 1991 during Phase I of the HPS UST program (PRC 1994b). USTs S-711 and S-712 were 5,000-gallon tanks

that stored gasoline. USTs S-713 and S-714 were 5,000-gallon tanks that stored diesel, and UST S-175 was a 500-gallon tank that stored waste oil. The 5,000-gallon gasoline and diesel fuel USTs (S-711 through S-714) were connected to two sets of dispenser pumps on a concrete pad located about 25 feet east of Building 709. A remote fill pipe connected to UST S-711 was located south of the tanks. UST S-715 was located at the southwest corner of Building 709 and was connected to a remote fill pipe leading from the tank into Building 709.

Two 30-gallon USTs (HPA-14 and HPA-15) were located inside Building 709. These tanks were removed in June 1993 during Phase II of the HPA UST program (PRC 1994b). These tanks were used to store hydraulic fluid for the automobile lifts inside Building 709.

Three TPH CAAs (8/8a, 9/9a, and 12) were excavated in 2004. Two additional TPH CAAs (17 and 18) are planned. Table A-3 in Appendix A provides more information on TPH CAAs.

4.3.5.1.6 IR-39

IR-39 extends into the southern portion of Redevelopment Block 43. Most of IR-39 lies within Redevelopment Block 40. The portion of the site that lies within Redevelopment Block 43 includes the narrow strip of land connecting Building 708 (former automotive repair shop) and IR-13, north of "J" Street (see Figure 4.3.5-1). Activities associated with this area are unknown.

One TPH CAA (19) was excavated in 2004. Another TPH CAA (20) is planned for 2008 through 2010. Table A-3 in Appendix A provides more information on TPH CAAs.

4.3.5.2 Geology and Hydrogeology

This section briefly discusses the geological and hydrogeological features beneath Redevelopment Block 43. A full description of geology and hydrogeology at Parcel E is presented in Sections 3.4 and 3.5, respectively.

The north- and south-central portions of Redevelopment Block 43 are covered by gravel and broken asphalt with vegetation. The center of this redevelopment block is paved, and the southern tip is bare dirt. From the surface downward, the geologic units at Block 43 consist of Artificial Fill, Undifferentiated Upper Sand Deposits, Bay Mud Deposits, Undifferentiated Sedimentary Deposits, and Franciscan Complex bedrock.

Artificial Fill at Redevelopment Block 43 consists mainly of clayey gravel with sand and bedrock boulders, ranging from 5 to 35 feet thick. The Undifferentiated Upper Sand Deposits are mainly absent at Redevelopment Block 43 and were found in two borings in IR-13 and one boring at IR-05, consisting mainly of poorly graded sand with shell fragments, ranging from 12 and 14 feet thick at IR-13 and approximately 4 feet thick at IR-05. The Bay Mud Deposits consist of fat clay with shell fragments, ranging from 0 to 76 feet thick. The depth to bedrock ranges from less than 20 to approximately 125 feet. Bedrock consists of serpentinite of the Franciscan Complex. The bedrock surface beneath Redevelopment Block 43 forms a portion of

the north and south slopes off of a west-trending bedrock high, centered beneath Building 406 in the adjacent Redevelopment Block 31B/36 (see Figure 3-8).

The hydrostratigraphy beneath Redevelopment Block 43 consists of an A-aquifer, an aquitard, and a B-aquifer. The A-aquifer consists of Artificial Fill and Upper Differentiated Sand Deposits. Based on average groundwater elevations measured in A-aquifer wells, the depth to groundwater in the A-aquifer ranges from 4.8 to 9.9 feet bgs throughout Redevelopment Block 43. Groundwater flow in the A-aquifer at Redevelopment Block 43 is generally east and northeast. The B-aquifer is separated from the A-aquifer by the Bay Mud aquitard. Beneath Redevelopment Block 43, the A- and B-aquifers are not in direct hydraulic communication. The general direction of groundwater flow for the B-aquifer is approximately southeast (see Figures 3-11 and 3-12).

4.3.5.3 Nature and Extent of Chemicals in Soil

This section summarizes the evaluation of the nature and extent of chemicals in soil at Redevelopment Block 43. The evaluation follows the approach for identifying chemicals and their spatial distribution described in Section 4.1.

4.3.5.3.1 Identification and Spatial Distribution of Chemicals in Soil

This section summarizes the chemicals identified in soil at Redevelopment Block 43. Approximately 919 soil samples were collected at Redevelopment Block 43. Figure 4.3.5-1 shows the locations where soil samples were collected from Redevelopment Block 43. Soil samples were analyzed for metals (including hexavalent chromium), VOCs, SVOCs (including PAHs), cyanide, pesticides, PCBs, and TPH.

Tables 4.3.5-1 and 4.3.5-2 present the summary statistics for chemicals that were detected at concentrations exceeding residential and industrial soil screening criteria. Table 4.3.5-1 presents statistics for 585 surface (0 to 10 feet bgs) soil samples; Table 4.3.5-2 presents statistics for 334 subsurface (deeper than 10 feet bgs) soil samples. Appendix C includes the complete soil data set used to generate the summary statistics tables for this redevelopment block.

The chemicals detected in soil are described below by analytical group: metals, VOCs, SVOCs, pesticides, PCBs, and TPH.

Metals

The risk from metals is primarily in the upper 10 feet of soil (see Appendix I); therefore, this discussion focuses on the data for metals in surface soil samples. Twenty-four metals were detected in soil samples collected from the surface to a depth of 10 feet bgs. Of the 24 metals detected, 11 were detected at concentrations exceeding residential soil screening criteria, and two metals were detected at concentrations that exceeded industrial soil screening criteria.

The lateral extent of elevated concentrations of metals was evaluated to identify areas in Redevelopment Block 43 exceeding Parcel E industrial screening criteria in soil. Figure 4.3.5-2 shows the sampling locations where concentrations of metals in soil from 0 to 10 feet bgs exceeded industrial screening criteria and presents the elevated concentrations at each location. Metals concentrations exceeded screening criteria at the following areas:

- Arsenic in IR-36 North, west of Building 405
- Arsenic east of Building 704
- Arsenic and lead between Buildings 371 and 709
- Arsenic northwest of Building 709
- Arsenic south of Building 709
- Arsenic in IR-13

Concentrations also exceeded screening criteria in isolated sampling locations as shown on Figure 4.3.5-2; however, the spatial distribution of these concentrations does not indicate a source area.

The area west of Building 405 in IR-36 North coincides with the railroad spur. Activities related to loading or unloading railroad cars may have resulted in releases of metals in this area. The area east of Building 704 is associated with the automotive repair shop; activities in the repair shop may have resulted in releases of metals, PAHs, and TPH. The area between Buildings 371 and 709 was identified as a stained area during a review of aerial photographs (Tetra Tech 2002a). Activities associated with this area may have resulted in releases of metals, PAHs, and TPH. The area northwest of Building 709 (southeast of Building 371) is associated with the service station at Building 709. Activities at the service station, including waste oil storage, may have resulted in releases of metals and PCBs. The area of IR-13 was used to store drums, sandblast waste, and an oily dirt pile. Activities associated with these uses may have resulted in the release of metals, PAHs, and PCBs.

Volatile Organic Compounds

Twenty-seven VOCs were detected in soil samples collected from the surface soil (0 to 10 feet bgs); however, benzene and naphthalene were the only VOCs detected at concentrations exceeding the Parcel E residential and industrial screening criteria (see Table 4.3.5-1). Nineteen VOCs were detected in soil samples collected deeper than 10 feet bgs; however, only benzene and naphthalene exceeded Parcel E residential screening criteria (see Table 4.3.5-2).

The lateral extent of elevated concentrations of benzene and naphthalene was evaluated to identify areas within Redevelopment Block 43 where these VOCs exceeded Parcel E industrial screening criteria. Figure 4.3.5-3 shows the sampling locations where VOC concentrations

exceeded Parcel E industrial screening criteria and presents the exceedance concentrations at each location. Benzene and naphthalene exceeded the criteria south of Building 709. USTs in this area were identified as the potential source of benzene and naphthalene in soil within Redevelopment Block 43.

Semivolatile Organic Compounds

Twenty-nine SVOCs were detected in one or more soil samples collected from the surface to 10 feet bgs. Twelve SVOCs were detected at concentrations exceeding Parcel E residential screening criteria in samples collected from 0 to 10 feet bgs, 5 of which exceeded the Parcel E industrial screening criteria (see Table 4.3.5-1). Eight SVOCs were also detected at concentrations exceeding Parcel E residential screening criteria in samples from greater than 10 feet bgs (see Table 4.3.5-2).

The lateral extent of elevated concentration of SVOCs was evaluated to identify areas within Redevelopment Block 43 where SVOCs exceeded Parcel E industrial screening criteria in soil. Figure 4.3.5-4 shows the sampling locations where SVOCs exceeded Parcel E industrial screening criteria and presents the elevated concentrations at each location. The SVOC concentrations exceeded screening criteria at the following areas:

- Area south of Building 709
- Area between Buildings 371 and 709
- Area in southern portion of IR-13
- Area west of Building 405

SVOCs also were detected at concentrations exceeding Parcel E screening criteria in several isolated borings, as shown on Figure 4.3.5-4. None of these isolated locations requires evaluation of spatial trends for SVOC concentrations.

The potential sources or Navy activities involving SVOCs included the service station at Building 709 and the commissary storehouse at Building 524 (IR-13). During Triple A's occupancy, drums containing liquids and an oily dirt pile were allegedly stored at IR-13 (Triple A Site 5) and sandblast waste was allegedly stored on the foundation of the former Building 524 (Triple A Site 15).

Pesticides

Twenty-one pesticides were detected in soil samples collected from the surface to 10 feet bgs; 17 pesticides were detected in soil samples collected deeper than 10 feet bgs. Four pesticides exceeded Parcel E residential screening criteria (see Table 4.3.5-1). No pesticide concentrations in soil from 0 to 10 feet bgs exceeded the Parcel E industrial screening criteria. As a result, the

nature and extent of pesticides in soil at Redevelopment Block 43 is not discussed further in this section.

Polychlorinated Biphenyls

Two PCBs were detected in soil samples collected from the surface to 10 feet bgs (see Table 4.3.5-1), both at concentrations exceeding Parcel E residential screening criteria. Only Aroclor-1260 was detected at concentrations that exceeded industrial screening criteria. Two PCBs were also detected in soil samples collected from greater than 10 feet bgs, only one at concentrations exceeding Parcel E residential screening criteria.

The lateral extent of elevated concentrations of PCBs was evaluated to identify areas within Redevelopment Block 43 where PCBs exceeded Parcel E industrial screening criteria in soil. Figure 4.3.5-5 shows the sampling locations where concentrations of PCBs exceeded Parcel E industrial screening criteria and presents the elevated concentrations at each location. Aroclor-1260 exceeded screening criteria at contiguous sampling locations in the following areas:

- Western portion of IR-05
- Northwest of Building 709
- Just southeast of IR-05

The potential sources or Navy activities involving PCBs included a storage yard for electrical transformers in the western portion of IR-05, and stained areas identified on aerial photographs in the area northwest of Building 709 (Tetra Tech 2002a). Potential activities related to PCBs in the area southeast of IR-05 are unknown.

Aroclor-1260 was also detected at concentrations exceeding Parcel E screening criteria in samples from isolated borings; none of the results for the isolated locations are indicative of a source of PCBs in soil.

Total Petroleum Hydrocarbons

TPH concentrations exceeded the soil source screening criterion in 61 samples; several locations were collocated with CERCLA chemicals. No free product was detected within this redevelopment block (Tetra Tech 2002b).

The lateral extent of elevated concentrations of TTPH was evaluated to identify areas within Redevelopment Block 43 where TTPH concentrations exceeded the soil source screening criterion in soil. Figure 4.3.5-5 shows the sampling locations where concentrations of TTPH exceeded the soil source screening criterion and presents the elevated concentrations at each location. TTPH exceeded the Parcel E screening criteria in soil at contiguous locations within the following three areas:

- Southeast of IR-05
- Between Buildings 371 and 709
- South of Building 709

Under the TPH program, these areas were investigated for petroleum; two CAAs (8/8a and 9/9a) are currently under additional investigation. Nearby the defined CAAs are areas where concentrations of metals, SVOCs, and PCBs were elevated.

The area northwest of IR-13 had TTPH concentrations exceeding the soil source criterion collocated with just one sampling location, where benzo(a)pyrene was detected at a concentration exceeding the soil source screening criterion. Therefore, it is considered a TPH-only site and is not addressed further in this section.

4.3.5.3.2 Extent of Chemicals in Soil

Eight areas were identified within Redevelopment Block 43 where concentrations of chemicals in soil exceeded Parcel E industrial screening criteria:

- Western portion of IR-05: PCBs (see Figure 4.3.5-5)
- Southeast of IR-05: PCBs (see Figure 4.3.5-5)
- IR-36 North, west of Building 405: metals and SVOCs (see Figures 4.3.5-2 and 4.3.5-4)
- East of Building 704: metals (see Figure 4.3.5-2)
- Between Buildings 371 and 709: metals, SVOCs and TTPH (see Figures 4.3.5-2, 4.3.5-4, and 4.3.5-5)
- Northwest of Building 709: metals and PCB (see Figures 4.3.5-2 and 4.3.5-5)
- South of Building 709: metals, VOCs, SVOCs, PCBs, and TTPH (see Figures 4.3.5-2, 4.3.5-3, 4.3.5-4, and 4.3.5-5)
- IR-13: metals and SVOCs (see Figures 4.3.5-2 and 4.3.5-4)

The west half of IR-05 is associated with the transformer storage area. The transformers were suspected of containing PCB oils, which may have leaked onto the soil. The estimated size of the area exceeding Parcel E screening criteria is 100 feet (east-west) by 200 feet (north-south). The depth to groundwater is 9.3 feet bgs.

The area west of Building 405 in IR-36 North coincides with the railroad spur. Activities related to loading or unloading railroad cars may have resulted in releases of metals. The estimated size of the area is 100 feet (east-west) by 150 feet (north-south). The depth to groundwater is 8.6 feet bgs.

The area northeast of Building 704 also coincides with the railroad spur. Activities related to loading or unloading railroad cars may have resulted in releases of PAHs, PCBs, and TPH. The estimated size of the area exceeding Parcel E screening criteria is 200 feet (east-west) by 100 feet (north-south). The depth to groundwater is 9.8 feet bgs.

The area east of Building 704 is associated with the automotive repair shop located at Building 704. Activities in the repair shop may have resulted in releases of metals, PAHs, and TPH. The estimated size of the area is 75 feet (east-west) by 200 feet (north-south). The depth to groundwater is 7.3 feet bgs.

The area south of Building 704 is associated with a storage yard for the automotive repair shop at Building 704 and the storehouse for miscellaneous equipment at Building 371. Wagner Construction Company also used this area for storage of diesel fuel, waste oil, hydraulic oil, and solvent. Activities associated with the storage yard may have resulted in releases of metals, PAHs, and TPH. It is assumed that Building 371 bounds the area to the west. The estimated size of the area is 100 feet (east-west) by 200 feet (north-south). The depth to groundwater is 7.3 feet bgs.

The area east of Building 371 is also associated with the storage yard for Building 371. This area was identified as a stained area during a review of aerial photographs (Tetra Tech 2002a). Activities associated with the storage yard may have resulted in releases of metals, PAHs, and TPH. The estimated size of the area is 150 feet (east-west) by 200 feet (north-south). The depth to groundwater is 7.5 feet bgs.

The area northwest of Building 709 is associated with the service station at Building 709. Activities at the service station, including waste oil storage, may have resulted in releases of metals and PCBs. The estimated size of the area is 100 feet (east-west) by 100 feet (north-south). The depth to groundwater is 7.5 feet bgs.

The area south of Building 709 is associated with the USTs used by the service station. The activities at the service station and USTs may have resulted in releases of metals, benzene, naphthalene, PAHs, and TPH. The estimated size of the area is 200 feet (east-west) by 150 feet (north-south). The depth to groundwater is 7.5 feet bgs.

The area exceeding Parcel E screening criteria in IR-13 is associated with Buildings 524 and 803, which were used as the commissary and commissary warehouse by the Navy. The area was also used by Triple A to store drums, sandblast waste, and an oily dirt pile. The building foundations also were used as decontamination facilities during environmental work at HPS. Activities associated with these uses may have resulted in the release of metals, PAHs, and PCBs. The estimated size of the area is 200 feet (east-west) by 200 feet (north-south). The depth to groundwater is 5.9 feet bgs.

4.3.5.4 Nature and Extent of Chemicals in Groundwater

This section summarizes the evaluation of the nature and extent of chemicals detected in groundwater samples collected from monitoring wells associated with Redevelopment Block 43. Figure 4.3.5-6 shows the locations of the groundwater monitoring wells associated with Redevelopment Block 43 where groundwater samples were collected for this evaluation.

Table 4.3.5-3 presents the summary statistics for chemicals that were detected in the A-aquifer wells associated with Redevelopment Block 43. No B-aquifer wells or bedrock water-bearing zone wells are associated with Redevelopment Block 43. Chemicals that were retained for evaluation based on consideration of the factors described in Section 4.1.2.2 are shaded and shown in bold font in this table. Appendix D includes the complete groundwater data set for this redevelopment block.

4.3.5.4.1 Chemicals in A-Aquifer Groundwater

Twenty-eight A-aquifer wells are associated with Redevelopment Block 43 (see Figure 4.3.5-6), including 2 wells located adjacent to the southeastern boundary of the redevelopment block. Groundwater samples collected from the A-aquifer wells were analyzed for metals (including hexavalent chromium), VOCs, SVOCs, cyanide, pesticides, PCBs, and TPH. Cyanide was not detected in any groundwater samples collected from A-aquifer wells; therefore, this chemical is not discussed further in this section.

The chemicals that were detected in groundwater samples collected from the A-aquifer are evaluated below by analytical group: metals, VOCs, SVOCs, pesticides, PCBs, and TPH.

Metals

Samples collected from the A-aquifer wells associated with Redevelopment Block 43 were analyzed for metals during one or more rounds of sampling; 24 metals were detected. Of the 24 metals detected, 5 (arsenic, copper, lead, mercury, and zinc) exceeded the appropriate screening criterion (surface water criteria, or HGALs if higher than surface water criteria) listed in Table 4.3.5-3. The spatial and temporal distributions of these five metals in groundwater are discussed below.

- Arsenic exceeded its surface water criterion (36 µg/L) and its HGAL (27.34 µg/L) in only three groundwater samples, collected from IR05MW85A in 1992 and 1995, with concentrations ranging from 27.4 to 148 µg/L. This well is located approximately 1,100 feet from the Bay. Arsenic was detected at concentrations below 14 µg/L in four subsequent samples collected from this well in 1996, 2001, and 2002.

- Copper exceeded its surface water criterion (3.1 µg/L) and its HGAL (28.04 µg/L) in five groundwater samples, collected from wells IR05MW85A and PA36MW03A in 1992, 1996, and 2002, with concentrations ranging from 0.95 to 366 µg/L. These wells are located approximately 1,100 feet from the Bay. Copper concentrations in samples collected from well IR05MW85A exceeded the HGAL by a factor of less than 2 and have not exceeded the screening criteria in the five samples collected from this well subsequent to 1992 (from 1995 through 2002). However, copper concentrations in the four samples collected from well PA36MW03A subsequent to 1993 have all exceeded the HGAL. The table below summarizes the analytical results for copper for this well, with the HGAL exceedances highlighted in bold.

Sampling Location	Sample Date	Copper (µg/L)	Qualifier
PA36MW03A	2/11/1993	2.1	
	2/11/1993	2	U
	2/7/1996	127	
	3/11/1996	366	
	7/31/2002	264	
	9/13/2002	186	

Copper concentrations detected in the two nearest wells (IR05MW85A and IR36MW15A), both located within 150 feet of well PA36MW03A, have not exceeded the HGAL since 1992. The presence of copper in groundwater is not directly related to any known source of contamination at IR-36. Staining at equipment storage buildings, storehouses, and a transportation shop was observed during the PA at IR-36.

- Lead exceeded its surface water criterion (5.6 µg/L) and its HGAL (14.44 µg/L) in only one groundwater sample. The single exceedance (31.4 µg/L) was detected in a sample collected from well IR05MW77A in February 1992, and was qualified as estimated because it was below the PQL. This well is located approximately 1,000 feet from the Bay. Lead was only detected in one of the four subsequent samples collected from this well in 1992, 2001, and 2002, at a concentration of 0.263 µg/L.
- Mercury exceeded its surface water criterion (0.025 µg/L) and its HGAL (0.6 µg/L) in four groundwater samples, collected from well IR05MW85A in 1992, 2002, and 2004, with concentrations ranging from 0.17 to 1.63 µg/L. This well is located approximately 1,100 feet from the Bay. Mercury has not been detected above 0.2 µg/L in the two most recent samples in the RI data set collected from this well (September and December 2004).

- Zinc exceeded its surface water criterion (81 µg/L) and its HGAL (75.68 µg/L) in five groundwater samples, collected from well IR38MW02A in 1994 and well PA36MW03A in 1996 and 2002, with concentrations ranging from 1.3 to 1,340 µg/L. Zinc was detected in one sample collected from well IR38MW02A in 1994, but both detections were below the quantitation limit and zinc was not detected in the subsequent two samples collected from this well in 1996. However, zinc has been detected in all five samples collected from well PA36MW03A, with the most recent four detections in the RI data set exceeding the HGAL. The table below summarizes the analytical results for zinc for this well, with the surface water criteria exceedances highlighted in bold.

Sampling Location	Sample Date	Zinc (µg/L)	Qualifier
PA36MW03A	2/11/1993	1.3	U
	2/11/1993	1	
	2/7/1996	365	
	3/11/1996	1,340	
	7/31/2002	621	
	9/13/2002	556	

Zinc concentrations detected in the two wells (IR05MW85A and IR36MW15A) nearest to PA36MW03A, both located within 150 feet of well PA36MW03A, have never exceeded either screening criteria. The presence of zinc in groundwater is not directly related to any known source of contamination at IR-36. Staining at equipment storage buildings, storehouses, and a transportation shop was observed during the PA at IR-36.

Only copper and zinc in A-aquifer groundwater at Redevelopment Block 43 are discussed further in this section and shown on Figure 4-3.

Volatile Organic Compounds

Samples collected from the A-aquifer wells associated with Redevelopment Block 43 were analyzed for VOCs during one or more rounds of sampling; 29 VOCs were detected. Of the 29 VOCs detected, 9 (benzene, bromodichloromethane, carbon tetrachloride, chloroform, ethylbenzene, naphthalene, PCE, TCE, and xylenes) exceeded at least one of the appropriate screening criteria (vapor intrusion and surface water criteria) listed in Table 4.3.5-3. The spatial and temporal distributions of these nine VOCs are discussed below.

- Benzene exceeded its vapor intrusion criterion (0.37 µg/L) in 12 of 128 groundwater samples collected. The exceedances were detected in samples collected from wells IR39MW21A and IR39MW33A. The table below summarizes the analytical results for benzene for these two A-aquifer wells, with the vapor intrusion criterion exceedances highlighted in bold.

Sampling Location	Sample Date	Benzene (µg/L)	Qualifier
IR39MW21A	6/22/1994	1500	
	1/23/1996	66	J
	2/26/1996	61	
	3/9/2001	9	
	7/2/2002	12	
	7/2/2002	10	
	9/9/2002	13	
	9/27/2002	14.1	
	6/16/2004	0.74	
	11/29/2004	71	
IR39MW33A	1/23/1996	4	
	2/26/1996	3	J
	3/29/1996	3	
	4/17/2001	0.5	U
	4/17/2001	0.5	U
	6/28/2002	0.29	J
	9/5/2002	0.23	J

The 2004 benzene groundwater plume in Redevelopment Block 43, as shown on Figure 4-4, was defined by the extent of benzene based on the 2004 quarterly groundwater monitoring data (see Table 4-4). The 2004 analytical results indicated that the plume was limited to an area around one well (IR39MW21A) and beneath the southern portion of Building 709. The potential source of benzene was the USTs south of Building 709.

- Bromodichloromethane exceeded its vapor intrusion criterion (1 µg/L) in 2 of 125 groundwater samples. The two exceedances, 2 and 4 µg/L, were detected in samples collected from well PA50MW09A in March and May 1996, respectively. Both exceedances were reported at concentrations near the detection limit and within an order of magnitude of the screening criteria.

Bromodichloromethane was not detected in the only previous sample collected from this well in 1993. No subsequent samples collected from well PA50MW09A were analyzed for bromodichloromethane. Bromodichloromethane has not been detected in groundwater samples collected from the nearest well, IR39MW36A, located approximately 60 feet from well PA50MW09A.

- Carbon tetrachloride exceeded its vapor intrusion criterion (0.046 µg/L) in 2 of 125 groundwater samples. The two exceedances were detected in samples collected from well IR36MW11A in March 2001 and from well IR36MW127A in June 2002, with concentrations ranging from 0.3 to 0.48 µg/L. Each detection was within one order of magnitude of the screening criteria and each detection was qualified as estimated because the concentration was detected below the PQL. Carbon tetrachloride was not detected in the four subsequent samples collected from each of these wells in 2002 and 2004.

- Chloroform exceeded its vapor intrusion criterion (0.7 µg/L) in 4 of 126 groundwater samples. The four exceedances were detected in samples, collected from well IR36MW11A in March 2001 and from well PA50MW09A in March and May 1996, with concentrations ranging from 5 to 54 µg/L. Chloroform was detected within one order of magnitude of the vapor intrusion criterion and below the PQL in the March 2001 sample from well IR36MW11A, but was not detected in the five subsequent samples collected from this well in 2002 and 2004. Chloroform was not detected in the 1993 sample from well PA50MW09A, but was detected in the two subsequent samples collected in 1996, at concentrations of 42 and 54 µg/L. No subsequent samples collected from well PA50MW09A were analyzed for chloroform. Chloroform has not been detected in groundwater samples collected from the nearest well, IR39MW36A, located approximately 60 feet from well PA50MW09A.
- Ethylbenzene exceeded its vapor intrusion criterion (3,100 µg/L) or its surface water criterion (86 µg/L) in only 1 of 128 groundwater samples. The single exceedance (550 µg/L) was detected in a sample collected from well IR39MW21A in June 1994. Ethylbenzene detections at well IR39MW21A have not exceeding screening criteria since June 1994 and decreased to less than 1 µg/L in November 2004.
- Naphthalene exceeded its vapor intrusion criterion (3.6 µg/L) in 7 of 105 groundwater samples. The seven exceedances were detected in samples, collected from IR05MW85A in 1992, IR39MW21A in 1994 and 1996, IR39MW23A in 1994, and IR39MW33A in 1996, with concentrations ranging from 4 to 220 µg/L. Naphthalene has not been detected in any of the last seven samples collected from well IR05MW85A since 1992. Detected concentrations of naphthalene at well IR39MW21A have decreased from 220 µg/L in 1994 to 0.41 in 2002, and have not exceeded any of the screening criteria since 1996. The detected naphthalene concentrations at wells IR39MW23A and IR39MW33A (6 and 4 µg/L in 1994 and 1996, respectively) were both within one order of magnitude of the screening criteria and qualified as estimated because they were below the PQL.
- PCE exceeded its vapor intrusion criterion (0.54 µg/L) in only 1 of 125 groundwater samples. The single exceedance (2 µg/L) was detected in a duplicate sample collected from well IR05MW76A in June 1992 and was qualified as estimated because it was below the PQL. PCE was not detected in the other June 1992 sample from IR05MW76A. PCE was not detected in the June 1992 duplicate sample or the preceding two samples collected from this well in November 1991 and February 1992.

- TCE exceeded its vapor intrusion criterion (2.9 µg/L) in 4 of 125 groundwater samples. The four exceedances were detected in samples collected from wells IR36MW11A in March 2001, IR36MW127A in June 2002, and IR39MW35A in February 1996, with concentrations ranging from 3 to 210 µg/L. The single detection at IR39MW35A (3 µg/L) was qualified as estimated because it was below the PQL. The single detection at IR36MW127A (5.9 µg/L) was within one order of magnitude of the screening criterion, and TCE was not detected in the four subsequent samples collected from this well in 2002 and 2004. TCE was detected in two samples collected from well IR36MW11A in March 2001 (200 µg/L in the one sample and 210 µg/L in the duplicate), but it was not detected in the five subsequent samples collected from this well in 2002 and 2004.
- Xylene (total) exceeded its vapor intrusion criterion (340 µg/L) in only 1 of 110 groundwater samples. The single exceedance (1,300 µg/L) was detected in a sample collected from well IR39MW21A in June 1994. Xylene detections at well IR39MW21A have decreased from 1,300 µg/L in June 1994 to 1 µg/L in both March 2001 and November 2004, and have not exceeded screening criteria since June 1994.

Only benzene in A-aquifer groundwater at Redevelopment Block 43 is discussed further in this section and shown on Figure 4-4.

Semivolatile Organic Compounds

Samples collected from the A-aquifer wells associated with Redevelopment Block 43 were analyzed for SVOCs during one or more rounds of sampling; 17 SVOCs were detected. Of the 17 SVOCs detected, only one (pentachlorophenol) exceeded at least one of the appropriate screening criteria (vapor intrusion and surface water criteria) listed in Table 4.3.5-3. The spatial and temporal distributions of this SVOC are discussed below.

Pentachlorophenol exceeded its surface water criteria (7.9 µg/L) in only 1 of 110 groundwater samples. The single exceedance (25 µg/L) was detected in a sample collected from well IR39MW23A in November 2004. Pentachlorophenol was not detected in the previous five samples collected from this well from September 1994 through September 2004. The detection limit for pentachlorophenol changed from 25 µg/L to 5 µg/L after 1996. Because pentachlorophenol exceeded criteria only once, this SVOC is not discussed further in this section.

Pesticides

Samples collected from the A-aquifer wells associated with Redevelopment Block 43 were analyzed for pesticides during one or more rounds of sampling; 12 pesticides were detected. Of the 12 pesticides detected, 7 pesticides (4,4'-DDT, alpha-chlordane, gamma-chlordane, endosulfan I, endrin, heptachlor, and heptachlor epoxide) exceeded the appropriate surface water criteria listed in Table 4.3.5-3. The spatial and temporal distributions of these seven pesticides are discussed below.

- 4,4'-DDT exceeded its surface water criterion (0.001 µg/L) in 3 of 99 groundwater samples. The three exceedances were detected in samples, collected from PA36MW03A and PA36MW06A in February 1993, and IR39MW21A in July 2002, with concentrations ranging from 0.002 to 0.064 µg/L. All detections but one (0.064 µg/L at IR39MW21A in July 2002) were qualified as estimated because the concentrations were detected below the PQL. 4,4'-DDT was not detected in the duplicate sample collected from IR39MW21A in July 2002 or in the three subsequent samples collected from this well in September 2002, June 2004, and November 2004. 4,4'-DDT was not detected in the four subsequent samples collected from PA36MW03A in 1996 and 2002, or the two subsequent samples collected from PA36MW06A in March and April 1996.
- Alpha-chlordane exceeded its surface water criterion (0.004 µg/L) in 2 of 99 groundwater samples. The two exceedances were detected in samples collected from IR39MW21A in June 1994 and IR36MW15A in September 1994, with concentrations ranging from 0.001 to 0.03 µg/L. All detections of alpha-chlordane were qualified as estimated because the concentrations were detected below the PQL. Alpha-chlordane was not detected in any of the samples collected from each of these wells subsequent to 1994.
- Gamma-chlordane exceeded its surface water criterion (0.004 µg/L) in only 1 of 99 groundwater samples. The single exceedance (0.02 µg/L) was detected in a sample collected from IR36MW15A in September 1994 and was qualified as estimated because the concentration was detected below the PQL. Gamma-chlordane was not detected in either of the two subsequent samples collected from this well in February and March 1996.
- Endosulfan I exceeded its surface water criterion (0.0087 µg/L) in only 1 of 99 groundwater samples. The single exceedance (0.0095 µg/L) was detected in a sample collected from IR39MW21A in June 2004 and was qualified as estimated because the concentration was detected below the PQL. Endosulfan I was not detected in any of the preceding six samples collected from this well from June 1994 through September 2002, or in the subsequent sample collected from this well in November 2004.
- Endrin exceeded its surface water criterion (0.0023 µg/L) in only 1 of 99 groundwater samples. The single exceedance (0.0095 µg/L) was detected in a sample collected from IR39MW21A in September 2002 and was qualified as estimated because the concentration was detected below the PQL. Endrin was not detected in any of the preceding five samples collected from this well from June 1994 through July 2002, or in the two subsequent samples collected from this well in June and November 2004.

- Heptachlor exceeded its surface water criterion (0.0036 µg/L) in 2 of 99 groundwater samples. The two exceedances (0.017 and 0.1 µg/L, respectively) were detected in samples collected from IR39MW21A in September 2002 and PA36MW07A in February 1993. The September 2002 detection at IR39MW21A was qualified as estimated because the concentration was detected below the PQL. Additionally, heptachlor was not detected in the five preceding samples from this well, collected from June 1994 to July 2002, or the two subsequent samples collected from this well in June and November 2004. Heptachlor was not detected in the subsequent five samples collected at PA36MW07A from February 1996 through September 2002.
- Heptachlor epoxide exceeded its surface water criterion (0.0036 µg/L) in 1 of 90 groundwater samples. The single exceedance (0.2 µg/L) was detected in a sample collected from IR39MW21A in February 1996 and was qualified as estimated because the concentration was detected below the PQL. Heptachlor epoxide was not detected in the two preceding samples from this well, collected in June 1994 and January 1996, or in the three subsequent samples collected from this well in March 2001, June 2004, and November 2004.

As a result, pesticides in A-aquifer groundwater at Redevelopment Block 43 are not discussed further in this section.

Polychlorinated Biphenyls

Samples collected from the A-aquifer wells associated with Redevelopment Block 43 were analyzed for PCBs during one or more rounds of sampling; only Aroclor-1260 was detected. Both detections of Aroclor-1260 exceeded the surface water criterion (0.03 µg/L), which is less than the reported detection limits (ranging from 0.1 to 10 µg/L). The spatial and temporal distributions of Aroclor-1260 are discussed below.

Aroclor-1260 was detected in samples collected from well IR05MW73A in June 1992 (0.8 µg/L) and well IR39MW21A in June 1994 (0.6 µg/L). Each detection was within one order of magnitude of the screening criteria, and each detection was qualified as estimated because the concentration was detected below the PQL. PCBs were not detected in any subsequent samples collected from either of these wells. As a result, Aroclor-1260 in A-aquifer groundwater at Redevelopment Block 43 is not discussed further in this section.

Total Petroleum Hydrocarbons

Samples collected from the A-aquifer wells associated with Redevelopment Block 43 were analyzed for TPH products during one or more rounds of sampling. TPH-d, TPH-g, and TPH-mo were detected in groundwater samples collected from 15, 10, and 20 A-aquifer wells, respectively. The maximum concentrations detected of each TPH range varied from 9,000 to 21,000 µg/L (see Table 4.3.5-3). The maximum concentrations were all less than the TPH screening criteria for groundwater except for one sample collected from IR36MW12A in September 1994, which was reported to contain a TPH-mo concentration of 21,000 µg/L. Total

TPH concentrations in seven subsequent samples collected from this well did not exceed the screening criteria, and a TPH-mo concentration of 190 µg/L was detected in the most recent sample in the RI data set collected in November 2004. As a result, TPH products in A-aquifer groundwater at Redevelopment Block 43 are not discussed further in this section.

4.3.5.4.2 Extent of Chemicals in Groundwater.

The screening process identified two areas within Redevelopment Block 43 where concentrations of chemicals in A-aquifer groundwater consistently exceeded Parcel E screening criteria:

- Monitoring well PA36MW03A: copper and zinc (see Figure 4-3 and Table 4-3)
- Monitoring well IR39MW21A: benzene (see Figure 4-4 and Table 4-4)

The presence of copper and zinc in A-aquifer groundwater is not directly related to any known source of contamination at IR-36, but may be related to the random and undocumented use of abrasive blast material (ABM) as fill material. Staining at equipment storage buildings, storehouses, and a transportation shop was observed during the PA at IR-36.

The presence of benzene in A-aquifer groundwater is related to the historical use of USTs south of Building 709, the former gas station.

4.3.5.5 Evaluation of Chemical Fate and Transport

As described in Sections 4.3.5.3 and 4.3.5.4, eight areas were identified where soil sampling results exceeded Parcel E soil screening criteria and two wells were identified where groundwater sampling results exceeded Parcel E groundwater screening criteria in Redevelopment Block 43. Chemicals identified in areas exceeding Parcel E screening criteria in soil are metals (arsenic and lead); VOCs (benzene and naphthalene); SVOCs; PCBs; and TPH. Copper, zinc, benzene, and chloroform were identified in groundwater. The persistence and mobility of these chemicals in soil and groundwater is discussed below.

Metals

Arsenic

Arsenic is largely immobile in soils, and the sorption of arsenic to soil and sediments slightly increases with an increase in pH. Soil pH within Redevelopment Block 43 ranges from 6.9 to 10.3 (see Appendix C). Average pH calculated as described in Section 4.3.2.5 is 8.2. Of 316 soil pH measurements only one was measured below 7.0. Although arsenic may be somewhat mobile in basic soils (see Appendix H), site conditions do not appear to favor leaching of arsenic into groundwater, because concentrations of arsenic in groundwater have been below Parcel E criteria since sampling in 1996. Therefore, the migration of arsenic from soil to

groundwater through leaching by infiltrating precipitation or fluctuating groundwater levels is not likely to be significant. As a result, the potential for arsenic to affect groundwater and bay water is expected to be limited.

Copper

Copper is mostly retained in soil through sorption mechanisms, so the migration of copper is not expected from soil to groundwater. Copper is not volatile. It is resistant to biodegradation and relatively insoluble under normal pH conditions; however, it may form some complexes that increase its mobility. Concentrations of copper exceeding Parcel E screening criteria were detected in groundwater at Well PA36MW03A; suggesting copper is leaching to groundwater at this location.

The concentration of copper detected during the most recent sampling event in the RI data set at Well PA36MW03A has decreased in comparison with concentrations detected during preceding sampling events. The 2004 groundwater plume extent estimated for copper in groundwater at Well PA36MW03A in Redevelopment Block 43 is located more than 2,000 feet away from the bay (see Figure 4-3) and is expected to remain stable in the future.

Lead

Lead is strongly sorbed to soils and sediments, and lead sorption depends on pH; at higher pH, all of the lead is bound to soils and sediments (see Appendix H). Soil pH within Redevelopment Block 43 ranges from 6.9 to 10.3 (see Appendix C). Average pH calculated as described in Section 4.3.2.5 is 8.2 and only one of 316 soil pH measurements is below 7.0. Based on predominantly above-neutral pH measured in the vadose soil for Redevelopment Block 43 and the high tendency of lead sorption onto soil, the potential for lead to migrate from vadose zone to groundwater is relatively low.

Mercury

Mercury is not expected to be overly mobile in soil environments and is typically found sorbed to soil inorganic and organic materials. The predominant soil type in the vadose zone across Redevelopment Block 43 is an Artificial Fill made up of clayey gravel with sand and bedrock boulders. Average TOC content in the upper 10 feet of soil is 1.8 percent, which suggests that sorption of mercury to soil can be significant. Therefore, the migration of mercury from soil to groundwater and transport of mercury in groundwater are expected to be limited at Redevelopment Block 43.

Zinc

The migration of zinc from soil to groundwater is expected to be very limited as a result of metal precipitation or sorption to soil under the alkaline conditions at Redevelopment Block 43. Based on the tendency of zinc to sorb to soils or aquifer materials, the migration of zinc in groundwater also is expected to be limited (see Appendix H).

Volatile Organic Compounds

Benzene

Benzene is highly soluble and has a relatively high vapor pressure. Based on an average TOC content in soil of 1.8 percent from 0 to 10 feet bgs for Redevelopment Block 43, sorption of benzene to soil can be significant (see Section 4.2). However, the sorption of dissolved benzene to soils or aquifer materials is not expected to affect substantially its transport. The predominant soil type in the vadose zone across Redevelopment Block 43 is Artificial Fill made up of clayey gravel with sand and bedrock boulders. Thus, the potential for chemicals to reach the water table or migrate to air is high (see Section 4.2). Benzene was detected in soil at deeper depths (saturated soil) and in groundwater at concentrations exceeding Parcel E screening criteria at wells located south of Building 709.

The groundwater depth (about 7.5 feet) is shallow in this area, suggesting benzene may have migrated in soil and groundwater. Benzene concentrations in groundwater in all of the wells appeared to decrease over time, suggesting the source of benzene is declining. The 2004 groundwater plume is about 1,000 feet away from the Bay (see Figure 4-4) and is expected to remain stable in the future.

Chloroform

Chloroform is expected to remain dissolved in groundwater and be transported downgradient because of high solubility and relatively high vapor pressure (see Appendix H). Chloroform was detected at concentrations exceeding Parcel E screening criteria at three wells. However, chloroform concentrations in two wells (IR36MW11A and IR36MW12A) appeared to decrease over time because chloroform was not detected in the most recent samples in the RI data set. In a third well (PA50MW09A), chloroform exceeded Parcel E screening criteria in 1996 and was not analyzed for after that. As a result, the potential for chloroform to further affect groundwater and migrate toward the Bay is expected to be limited.

Naphthalene

Naphthalene was identified exceeding Parcel E screening criteria in soil at Redevelopment Block 43. Based on an average TOC content in soil of 1.8 percent from 0 to 10 feet bgs for Redevelopment Block 43, the mobility of naphthalene in soil and sediments would be limited because it has (1) a low solubility in water, (2) a relatively low vapor pressure, and (3) a tendency to strongly sorb to organic carbon in soil. As a result, naphthalene is not expected to leach to groundwater at Redevelopment Block 43.

Semivolatile Organic Compounds

Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and benzo(k)fluoranthene were detected in surface soil and at deeper depths (saturated soil) at concentrations exceeding Parcel E screening criteria; PAHs did not exceed Parcel E screening criteria in groundwater. Based on an

average TOC content in soil of 1.8 percent from 0 to 10 feet bgs for Redevelopment Block 43, the mobility of these PAHs in soil would be very limited because these chemicals have (1) a very low solubility in water; (2) a low vapor pressure, and (3) a tendency to strongly sorb to organic carbon in soil. As a result, the potential for these chemicals to migrate from the vadose zone into groundwater is relatively low.

Polychlorinated Biphenyls

Aroclor-1260 has very low solubility and low vapor pressure because of a high level of chlorination (see Appendix H). As a result, the potential for these chemicals to migrate from the vadose zone into groundwater is relatively low. It is expected to be persistent in the environment and is resistant to biodegradation under aerobic conditions.

Total Petroleum Hydrocarbons

The detections of TPH in soil that were noted for further evaluation are associated with TPH-gasoline, -diesel, and -motor oil range. Petroleum hydrocarbons are known to sorb to soil and have low to moderate solubilities in water. Based on the average TOC content of 1.8 percent in soil from 0 to 10 feet bgs at Redevelopment Block 43, the mobility of TPH in soil is expected to be limited because of sorption to organic carbon in soil. As a result, it is expected that the migration of petroleum hydrocarbons from soil to groundwater and the continued migration with groundwater would be limited.

4.3.6 Redevelopment Block 44

This section summarizes the site characterization of Redevelopment Block 44, including the site history (see Section 4.3.6.1), the geology and hydrogeology (see Section 4.3.6.2), the nature and extent of chemicals in soil (see Section 4.3.6.3), the nature and extent of chemicals in groundwater (see Section 4.3.6.4), and the fate and transport of chemicals in soil and groundwater (see Section 4.3.6.5). The planned reuse for this block is industrial. No tenants are currently present on this redevelopment block.

4.3.6.1 Site History

Redevelopment Block 44 is located in the central portion of Parcel E. Redevelopment Block 44 contains portions of four IR sites: IR-02 Northwest, IR-02 Central, IR-12, and IR-39. Site features within Redevelopment Block 44 are shown on Figure 1-13. The subsections below discuss the historical uses of each IR site located within the boundaries of Redevelopment Block 44.

4.3.6.1.1 IR-02 Northwest

The eastern-most portion of IR-02 Northwest lies within the western part of Redevelopment Block 44, while the remainder of IR-02 Northwest is located in Redevelopment Block EOS-1.

IR-02 Northwest, known as the Bay Fill Area, was used by the Navy as a disposal site for industrial waste. Early Navy maps show an area in IR-02 Northwest referred to as the "disposal dump area" (PRC 1996b). Aerial photographs from 1948 to 1958 indicated that soils in this area were continuously excavated and filled with construction and industrial debris from other areas at HPS (PRC 1996c). During RI field activities conducted in the disposal dump area, construction and industrial debris were found to a maximum depth of 15 feet bgs; these materials included sandblast waste, paint chips, glass, cloth, plastic, paper, cardboard, styrofoam, metal, brick, wire, wood, nails, and pipe.

4.3.6.1.2 IR-02 Central

A portion of IR-02 Central is located in the southeastern part of Redevelopment Block 44; the remainder of this IR site is within Redevelopment Blocks EOS-1, EOS-2, EOS-3, and EMI-1. The portion of IR-02 Central that lies within Redevelopment Block 44 includes the following site features (see Figure 1-13):

- Building 600
- Triple A Site 19

Building 600

Building 600 is a multi-storied building that was intended to be used as a dormitory and barracks but was never actually occupied (Tetra Tech 1998a). The roads and parking lot near Building 600 are the only paved areas within IR-02 Central.

Triple A Site 19

Triple A Site 19 is located about 250 feet northwest of Building 600 (in Redevelopment Block 44). Triple A Site 19 was a baseball diamond that was investigated because oil-saturated soils were present in the center of the field (DHS 1988). According to information collected during the SFDA's investigation, waste liquids (such as oils, solvents, and paint) were allegedly transported to Triple A Site 19 by vacuum truck from other areas at HPS and then dumped on the baseball field; these liquids were usually disposed of late in the day (DHS 1988). The following day, brush in this area was reportedly ignited to burn off the flammable liquids that had been dumped on the ground (DHS 1988). Waste disposal activities at Triple A Site 19 occurred sometime between 1976 and 1986.

4.3.6.1.3 IR-12

A portion of Site IR-12 is located in the northern part of Redevelopment Block 44; the remainder of this site is in Redevelopment Block 45. IR-12 covers approximately 8.5 acres and consists of the following features (see Figure 1-13).

- Disposal Trench Area (Triple A Site 4)
- Salvage Yard (Triple A Site 3)

Disposal Trench Area

The disposal trench area, also known as Triple A Site 4, contains a 40-foot by 20-foot concrete pad where Triple A allegedly crushed drums. Triple A Site 4 is located in the southwestern portion of IR-12, and is located primarily within Redevelopment Block 44. Waste paints and other liquids from crushed drums are believed to have run off of the concrete slab to the soil surrounding the pad. Partially buried drums and paint cans were also observed in the area surrounding the concrete pad (SFDA 1986). Asbestos, acids, and bases also were allegedly disposed of in open trenches in the disposal trench area. Also, an estimated 2,000 gallons of chlorinated solvents, lead-based paints, paint chips, and other waste liquids were allegedly disposed of in trenches (HLA 1989b). Soil samples were collected adjacent to and beneath former concrete slabs in IR-12. Metals, SVOCs, and PCBs were detected at concentrations exceeding industrial soil screening criteria (see Section 4.3.6.3.1).

Salvage Yard

The salvage yard, also known as Triple A Site 3, was used by the Navy and Triple A to store equipment for reuse. The southern third of Triple A Site 3 is located within Redevelopment Block 44. Triple A allegedly engaged in scrap metal stripping operations involving electrical cable, pipe lagging, and motor vehicles. Spilled oil and liquid chemicals were observed on the ground, and some of these liquids appeared to have run directly into a storm drain in the salvage yard. Drums, batteries, wire insulation, and asbestos lagging were also observed at the salvage yard while Triple A occupied HPS (SFDA 1986).

4.3.6.1.4 IR-39

The northernmost portion of IR-39 is located in the eastern part of Redevelopment Block 44. The site features located within Redevelopment Block 44 are as follows (see Figure 1-13):

- Building 707
- Building 708

Building 707

Building 707, located in Block 44, was constructed in 1950 and was used as the NRDL research animal colony until 1969; laboratory animals were bred and housed in the building (PRC 1996c). In January 1970, Building 707 was inspected and cleared by the AEC for unrestricted use (AEC 1970). Therefore, an additional confirmation radiation survey of Building 707 was not recommended or performed as part of the current phase of environmental investigations. The regulatory agencies concurred that additional investigation of Building 707 was not required (PRC 1993). Building 707 was leased to Pet Express for use as an animal clinic, but is now vacant (HLA 1994d).

Five 55-gallon drums were present during the 1996 investigation, stored at the northwest corner of Building 707. Labels on the drums indicated that they contained detergent used at the clinic as disinfectant and for odor control. The drums were mostly empty and did not appear to have leaked. Several rooms in Building 707 were littered with soiled rags, paint cans, and other containers. No releases of hazardous substances were reported (PRC 1996c). In 1988, two 55-gallon drums with some tar leakage, an oven with asbestos lining, a 250-gallon tar tank, and two carbon dioxide cartridges were observed in the area surrounding Building 707 (ERM-West 1988).

During the 1950s, a concrete pad adjacent to the west side of Building 707 was used by the NRDL to store drums of mixed and low-level radioactive waste prior to their shipment to an off-site disposal facility (PRC 1996c). The concrete pad and nearby surface areas were surveyed during the Phase III radiation investigation. During this investigation, residual radioactive contamination was found in two areas on the concrete pad and two asphalt areas near the pad and will be addressed under the Navy's radiological program.

Building 708

Building 708, located in Block 44, is a Quonset hut built in 1953; the building has a single story and is constructed of wood and metal (PRC 1996c). Building 708 was used as the NRDL biomedical facility sometime during the 1950s and 1960s; however, radioactive materials were apparently never used or stored in the building (RASO 1995). Therefore, AEC surveys and clearance were not required and an additional confirmation radiation survey of the building was not recommended or performed. The regulatory agencies concurred that additional investigation of Building 708 was not required (PRC 1993).

4.3.6.2 *Geology and Hydrogeology*

This section briefly discusses the main geological and hydrogeological features that exist beneath Redevelopment Block 44. A full description of geology and hydrogeology at Parcel E is presented in Sections 3.4 and 3.5, respectively.

The surface of Redevelopment Block 44 consists of approximately 50 percent bare dirt and dirt roads, 25 percent gravel and broken asphalt with vegetation, and 25 percent ruderal vegetation. From the surface downward, the geologic units at Redevelopment Block 44 consist of Artificial Fill, Undifferentiated Upper Sand Deposits, Bay Mud Deposits, Undifferentiated Sedimentary Deposits, and Franciscan Complex bedrock.

The Artificial Fill at Redevelopment Block 44 consists predominantly of clayey and silty sand, gravel to poorly graded sand, and boulder fill. The Artificial Fill ranges from approximately 10 to 49 feet thick. Undifferentiated Upper Sand Deposits, encountered only intermittently at Redevelopment Block 44, consist of dark gray to greenish-gray, poorly graded sand, with trace amounts of shell fragments and varying proportions of silt and clayey sand, ranging from 7 to 13 feet thick. In general, these deposits underlie the Artificial Fill and overlie the Bay Mud Deposits. However, in the central part of Redevelopment Block 44, the Artificial Fill directly overlies the Bay Mud. The Bay Mud Deposits, which range from 5 to 50 feet thick (see Figure 3-7), consist of dark greenish- to bluish-gray, fat clay, with varying proportions of sand and/or silt (0 to 30 percent) and minor amounts of shell fragments. The Bay Mud Deposits appear to be laterally continuous beneath the site, and dip approximately from the northeast to the southwest boundary toward a marked depression within the Bay Mud surface at the southern end of the site (see Figure 3-7). Undifferentiated Sedimentary Deposits, consist of greenish-, yellowish-, or bluish-gray, fine- to medium-grained sands that are interbedded with sandy or silty clay and range from 0 to 250 feet thick. Bedrock was not encountered during drilling at Redevelopment Block 44. However, the bedrock surface, which is estimated to occur at depths ranging from approximately 75 to 250 feet below msl, dips from the northeast to the southwest toward the Bay (see Figure 3-8).

The hydrostratigraphy beneath Redevelopment Block 44 consists of an A-aquifer, an aquitard, and a B-aquifer. The A-aquifer consists of Artificial Fill and Upper Differentiated Sand Deposits. Based on average groundwater elevations measured in A-aquifer wells, the depth to groundwater in the A-aquifer ranges from 5.1 to 9.9 feet bgs throughout the block. Groundwater flow in the A-aquifer at Redevelopment Block 44 is generally to the east and northeast (see Figures 3-9 and 3-10). The B-aquifer is separated from the A-aquifer by the Bay Mud aquitard. Beneath Redevelopment Block 44, the A- and B-aquifers are not in direct hydraulic communication. The general direction of groundwater flow for the B-aquifer is approximately southeast (see Figures 3-11 and 3-12).

4.3.6.3 *Nature and Extent of Chemicals in Soil*

This section summarizes the evaluation of the nature and extent of chemicals in soil collected from soil borings associated with Redevelopment Block 44. The evaluation follows the approach for identifying chemicals and their spatial extent described in Section 4.1.

4.3.6.3.1 Identification and Spatial Distribution of Chemicals in Soil

This section summarizes the chemicals identified in soil at Redevelopment Block 44. Approximately 428 samples were collected at Redevelopment Block 44. Figure 4.3.6-1 shows the locations where soil samples were collected that are associated with Redevelopment Block 44. Soil samples were analyzed for metals (including hexavalent chromium), VOCs, SVOCs (including PAHs), cyanide, pesticides, PCBs, TPH, dioxin, and radioactive materials. Radiological data are being addressed as part of the radiological program for HPS; therefore, these data are not discussed further in this Revised Parcel E RI Report.

Tables 4.3.6-1 and 4.3.6-2 present the summary statistics for chemicals that were detected at concentrations exceeding the residential and industrial soil screening criteria. Table 4.3.6-1 presents statistics for 267 surface (0 to 10 feet bgs) soil samples; Table 4.3.6-2 presents statistics for 114 subsurface (deeper than 10 feet bgs) soil samples. Appendix C includes the complete soil data set used to generate the summary statistics tables for this redevelopment block.

The chemicals detected in soil are described below by analytical group: metals (including hexavalent chromium), VOCs, SVOCs (including PAHs), cyanide, pesticides, PCBs, TPH, and dioxins.

Metals

The risk due to metals is primarily in the upper 10 feet of soil (see Appendix I); therefore, this discussion focuses on the data for metals in surface soil samples. Twenty-four metals were detected in soil samples collected from the surface to a depth of 10 feet bgs. Of the 24 metals detected, 12 metals had one or more detected concentrations exceeding the residential soil screening criteria; one or more detected concentrations for three metals exceeded the industrial soil screening criteria.

The lateral extent of elevated concentrations of metals was evaluated to identify areas in Redevelopment Block 44 exceeding Parcel E industrial screening criteria in soil. Figure 4.3.6-2 shows the sampling locations where concentrations of metals in soil from 0 to 10 feet bgs exceeded industrial screening criteria and presents the elevated concentration at each location. Concentrations of these metals exceeded the screening criteria in soil at contiguous sampling locations in the northern, central, and southern portions of Redevelopment Block 44. Isolated locations with elevated concentrations of metals also are shown on Figure 4.3.6-2; none of the results for isolated locations are indicative of a source area.

Concentrations of metals that exceeded industrial soil screening criteria in the northern portion of Redevelopment Block 44 may be a result of activities related to the disposal trench and disposal dump area. These activities may have resulted in releases of metals to soil. Elevated concentrations of metals in the central portion of the redevelopment block may be a result of dumping associated with the waste liquids dumping area. ABM is a potential source of elevated concentrations of metals along the western portion of Redevelopment Block 44 within IR-02

Northwest. In the southern portion, activities associated with the former oil reclamation ponds may have contributed to the elevated concentrations of metals.

Volatile Organic Compounds

Thirty-one VOCs were detected in soil samples collected from surface soil (0 to 10 feet bgs). Of the 31 VOCs, only 5 VOCs had one or more concentrations exceeding the Parcel E residential screening criteria; one or more detected concentrations of three VOCs exceeded industrial soil screening criteria (see Table 4.3.6-1). Seventeen VOCs were detected in soil samples collected from deeper than 10 feet bgs; however, no VOCs exceeded the Parcel E residential or industrial screening criteria.

The lateral extent of elevated concentrations of VOCs was evaluated to identify areas within Redevelopment Block 44 where VOCs exceeded Parcel E industrial screening criteria in soil. Figure 4.3.6-3 shows the sampling locations where concentrations of VOCs exceeded Parcel E industrial screening criteria and presents the exceedance concentrations at each location. Concentrations of VOCs exceeded the screening criteria in soil at isolated sampling locations in the central portion of Redevelopment Block 44; none of the isolated locations of VOCs are indicative of a source area.

Elevated concentrations of VOCs in the central portion of the Redevelopment Block may be a result of dumping activities associated with the waste liquids dumping area.

Semivolatile Organic Compounds

Thirty-three SVOCs were detected in one or more soil samples collected from surface soil (0 to 10 feet bgs). Of the 33 SVOCs detected, 9 SVOCs had one or more concentrations exceeding Parcel E residential screening criteria, six of which exceeded the Parcel E industrial screening criteria (see Table 4.3.6-1). Nineteen SVOCs were detected in one or more samples collected from greater than 10 feet bgs; however, only one SVOC was detected at a concentration exceeding the Parcel E residential screening criteria.

The lateral extent of elevated concentrations of SVOCs was evaluated to identify areas within Redevelopment Block 44 where SVOC concentrations exceeded Parcel E industrial screening criteria in soil. Figure 4.3.6-4 shows the sampling locations where concentrations of SVOCs exceeded Parcel E industrial screening criteria and presents the elevated concentrations at each location. Concentrations of SVOCs exceeded the screening criteria in soil at contiguous sampling locations in the northern and southern portions of Redevelopment Block 44. Concentrations at several isolated locations also exceeded the screening criteria; none of the isolated locations of SVOCs are indicative of a source area.

Concentrations of SVOCs that exceeded industrial soil screening criteria in the northern portion of Redevelopment Block 44 may be a result of activities related to the disposal trench and disposal dump area. These activities may have resulted in releases of SVOCs to soil. In the

southern portion, activities associated with the former oil reclamation ponds may have contributed to the elevated concentrations of metals and SVOCs.

Cyanide

Cyanide was detected in 5 of 77 samples collected from surface soil (0 to 10 feet bgs); the detected concentration did not exceed the Parcel E residential or industrial screening criteria (see Appendix C). Cyanide was not detected in six soil samples collected deeper than 10 feet bgs (see Appendix C). As a result, the nature and extent of cyanide in soil at Redevelopment Block 44 is not discussed further in this section.

Pesticides

Twenty-two pesticides were detected in soil samples collected from surface soil (0 to 10 feet bgs). Of the 22 pesticides, 5 pesticides were detected at concentrations exceeding the Parcel E residential screening criteria; only one pesticide (Aldrin) was detected at concentrations that exceeded industrial screening criteria, at an isolated location (see Figure 4.3.6-5). No pesticides were detected in soil samples collected deeper than 10 feet bgs. Based on the low frequency of detection, the nature and extent of pesticides in soil at Redevelopment Block 44 is not discussed further in this section.

Polychlorinated Biphenyls

Twenty-two PCBs were detected in soil samples collected from the surface to 10 feet bgs (see Table 4.3.6-1). Of the 22 PCBs, 3 PCBs were detected at concentrations exceeding the Parcel E residential and industrial screening criteria. One PCB was detected at concentrations exceeding the Parcel E residential screening criteria in soil samples collected from greater than 10 feet bgs (see Table 4.3.6-2).

The lateral extent of elevated concentrations of PCBs was evaluated to identify areas within Redevelopment Block 44 where PCB concentrations exceeded Parcel E industrial screening criteria in soil. Figure 4.3.6-5 shows the sampling locations where concentrations of PCBs exceeded Parcel E industrial screening criteria and presents the exceedance concentrations at each location. Concentrations of PCBs exceeded the screening criteria in soil at a contiguous sampling location in the northern portion of Redevelopment Block 44.

Concentrations of PCBs that exceeded industrial soil screening criteria in the northern portion of Redevelopment Block 44 may be a result of activities related to the disposal trench and disposal dump area. These activities may have resulted in releases of PCBs to soil.

Total Petroleum Hydrocarbons

TPH concentrations exceeded the soil source screening criterion in 11 samples; several of the locations were collocated with CERCLA chemicals. No free product was detected in monitoring wells within this redevelopment block (Tetra Tech 2002c).

The lateral extent of elevated concentrations of TTPH was evaluated to identify areas within Redevelopment Block 44 where TTPH exceeded the soil source screening criterion in soil. Figure 4.3.6-5 shows the sampling locations where concentrations of TTPH exceeded Parcel E the soil source screening criterion and presents the elevated concentrations at each location. Concentrations of TTPH exceeded screening criteria in soil at contiguous sampling locations in the central portion of Redevelopment Block 44. CAA5, under the TPH program, is located along the northwestern border of Redevelopment Block 44.

Dioxins

Two dioxins were detected in soil samples collected from surface soil (0 to 10 feet bgs); the detected concentrations did not exceed the Parcel E residential screening criterion by more than one order of magnitude; no concentrations were detected that exceeded the industrial soil screening criteria for dioxins (see Table 4.3.6-1). Dioxins were not detected in six soil samples collected deeper than 10 feet bgs (see Appendix C). As a result, the nature and extent of dioxins in soil at Redevelopment Block 44 is not discussed further in this section.

4.3.6.3.2 Extent of Chemicals in Soil

Three areas were identified within Redevelopment Block 44 where concentrations of chemicals in soil at contiguous locations exceeded Parcel E industrial screening criteria:

- Northern portion of Redevelopment Block 44: metals, SVOCs, and PCBs (see Figures 4.3.6-2, 4.3.6-4, and 4.3.6-5)
- Central portion of Redevelopment Block 44: metals, VOCs, SVOCs, and TTPH (see Figures 4.3.6-2, 4.3.6-3, 4.3.6-4, and 4.3.6-5)
- Southern portion of Redevelopment Block 44: metals and SVOCs (see Figures 4.3.6-2 and 4.3.6-4)

The northern portion of Redevelopment Block 44 includes the area northwest of Building 707 that coincides with the disposal trench area (also known as Triple A Site 4) and the area west of "J" Street in the northwest corner of Redevelopment Block 44 that coincides with the eastern edge of the Bay Fill Area, used by the Navy as a disposal site for industrial waste. Activities related to the disposal trench and disposal dump area may have resulted in releases of metals, SVOCs, and PCBs to soil. The estimated size of the area northwest of Building 707 is 300 feet

(east-west) by 450 feet (north-south). The depth to groundwater is 9.6 feet bgs. The area west of "J" Street is described further in Redevelopment Block EOS-1 (see Section 4.3.9).

The central portion of Redevelopment Block 44 coincides with Triple A Site 19, a dumping area for waste liquids (such as oils, solvents, and paint). Dumping activities may have resulted in elevated concentrations of metals, VOCs and TPH. ABM is a potential source of elevated concentrations of metals along the western portion of Redevelopment Block 44 within IR-02 Northwest. The estimated size of the area is 400 feet (east-west) by 400 feet (north-south). The depth to groundwater is 6.6 feet bgs.

The area in the southern corner of Redevelopment Block 44 coincides with the eastern border of IR-03, the former oil reclamation ponds. Activities associated with the former oil reclamation ponds may have contributed to the elevated concentrations of metals and SVOCs. This area is described further in Redevelopment Block EOS-2 (see Section 4.3.10). The depth to groundwater is 6.9 feet bgs.

4.3.6.4 Nature and Extent of Chemicals in Groundwater

This section summarizes the evaluation of the nature and extent of chemicals detected in groundwater samples collected from monitoring wells associated with Redevelopment Block 44. Figure 4.3.6-6 shows the locations of the groundwater monitoring wells associated with Redevelopment Block 44 where groundwater samples were collected for this evaluation.

Table 4.3.6-3 presents the summary statistics for chemicals that were detected in samples collected from the A-aquifer wells. No B-aquifer wells or bedrock water-bearing zone wells are associated with Redevelopment Block 44. Chemicals that were retained for evaluation based on consideration of the factors described in Section 4.1.2.2 are shaded and shown in bold font in these tables. Appendix D includes the complete groundwater data set for this redevelopment block.

4.3.6.4.1 Chemicals in the A-Aquifer

Twenty A-aquifer wells are associated with Redevelopment Block 44 (see Figure 4.3.6-6), including 1 well located just outside the south-central border of the redevelopment block. Groundwater samples collected from the A-aquifer wells were analyzed for metals (including hexavalent chromium), VOCs, SVOCs, cyanide, pesticides, PCBs, and TPH. PCBs were not detected in any groundwater samples collected from A-aquifer wells; therefore, these chemicals are not discussed further in this section.

The chemicals that were detected in groundwater samples collected from the A-aquifer are evaluated below by the following analytical groups: metals, VOCs, SVOCs, cyanide, pesticides, and TPH.

Metals

Samples collected from the A-aquifer wells associated with Redevelopment Block 44 were analyzed for metals during one or more rounds of sampling; 23 metals were detected. Of the 23 metals detected, 5 metals (arsenic, cadmium, chromium, copper, and nickel) exceeded the appropriate screening criterion (surface water criteria, or HGALs if greater than surface water criteria). The spatial and temporal distributions of these five metals are discussed below.

- Arsenic exceeded its surface water criterion (36 µg/L) and its HGAL (27.34 µg/L) in only two groundwater samples, collected from IR12MW18A in August 1992 (62.8 µg/L) and IR12MW20A in September 1992 (45.5 µg/L). These wells are located approximately 800 feet from the Bay. Arsenic was either not detected or detected at concentrations less than 3 µg/L in four subsequent samples collected from well IR12MW18A (in March 1996, March 2001, July 2002, and September 2002). Arsenic detections in the four subsequent samples collected from well IR12MW20A (from March 1996 to September 2002) have ranged from 20.4 to 26 µg/L.
- Cadmium exceeded its surface water criterion (8.8 µg/L) and its HGAL (5.08 µg/L) in 4 of 80 samples. The four exceedances were detected in samples collected from wells IR02MW101A2, IR02MW114A1, and IR02MW114A3 in August 1992, and well IR36MW135A in January 1996, with concentrations ranging from 10.5 to 37.9 µg/L. These wells are located approximately 400 feet from the Bay, except for IR36MW135A, which is located approximately 900 feet from the Bay. Cadmium has not been detected above the HGAL in any subsequent samples collected from A-aquifer wells in Redevelopment Block 44 (from February 1996 through September 2002).
- Chromium exceeded its surface water criterion (50 µg/L) and its HGAL (15.66 µg/L) in 3 of 69 samples. The three exceedances were detected in samples collected from wells IR02MW101A1, IR02MW114A2, and IR02MW298A in July 1992. Chromium has not been detected above the HGAL in any subsequent samples collected from A-aquifer wells in Redevelopment Block 44 (from August 1992 through September 2002).
- Copper exceeded its surface water criterion (3.1 µg/L) and its HGAL (28.04 µg/L) in only one groundwater sample, collected from IR02MW114A2 in July 1992, with a concentration of 32.9 µg/L. This well is located approximately 400 feet from the Bay. Copper was detected at a concentration of 4.18 µg/L in the subsequent sample collected from well IR02MW114A2 (in August 1992) and was not detected at a reporting limit of 8 µg/L in the three most recent samples in the RI data set collected from this well (in 2001 and 2002).

- Nickel exceeded its surface water criterion (8.2 µg/L) and its HGAL (96.48 µg/L) in 11 of 79 groundwater samples. The 11 exceedances were detected in samples collected from six wells (IR02MW101A1, IR02MW114A2, IR02MW298A, IR02MW89A, IR02MW93A, and IR12MW18A). Nickel detections have not exceeded the HGAL in samples collected from any of these wells subsequent to 1992, except at IR12MW18A. This well is located approximately 800 feet from the Bay. The table below summarizes the analytical results for nickel for this well, with the HGAL exceedances highlighted in bold.

Sampling Location	Sample Date	Nickel (µg/L)
IR12MW18A	08/19/92	213
	09/24/92	214
	03/25/96	154
	03/09/01	124
	07/18/02	123
	09/05/02	127

The 2004 nickel groundwater plume in Redevelopment Block 44, shown on Figure 4-3, was defined by the extent of nickel based on the 2004 quarterly groundwater monitoring data (see Table 4-3). The 2004 analytical results indicated that the plume was limited to an area around one well (IR12MW18A). The source of nickel in groundwater may be associated with wastes disposed of in the disposal trench area at IR-12.

Only nickel in A-aquifer groundwater at Redevelopment Block 44 is discussed further in this section.

Volatile Organic Compounds

Samples collected from the A-aquifer wells associated with Redevelopment Block 44 were analyzed for VOCs during one or more rounds of sampling; 24 VOCs were detected. Of the 24 VOCs detected, 8 VOCs (1,1-dichloroethane [-DCA], 1,4-DCB, benzene, chloroethane, chloroform, naphthalene, PCE, and TCE) exceeded at least one of the appropriate screening criteria (vapor intrusion and surface water criteria). The spatial and temporal distributions of these eight VOCs are discussed below.

- 1,1-DCA exceeded its vapor intrusion criterion (6.5 µg/L) in 8 of 83 groundwater samples. The eight exceedances were detected in samples collected from well IR12MW17A in March 1996 (17 µg/L) and well IR12MW19A from 1992 to 2002 (ranging from 9.7 to 28.13 µg/L). 1,1-DCA has not been detected above 1 µg/L in the six samples collected from well IR12MW17A since 1996. The table below summarizes the analytical results for 1,1-DCA at well IR12MW19A, with the vapor intrusion criterion exceedances highlighted in bold.

Sampling Location	Sample Date	1,1-DCA (µg/L)
IR12MW19A	08/19/1992	17
	09/25/1992	28.13
	03/25/1996	19
	03/12/2001	15
	07/26/2002	14
	09/11/2002	9.7

The 2004 1,1-DCA groundwater plume in Redevelopment Block 44, shown on Figure 4-4, was defined by the extent of 1,1-DCA based on the 2004 quarterly groundwater monitoring data (see Table 4-4). The source of 1,1-DCA in groundwater collected from this monitoring well is possibly associated with wastes disposed of in the disposal trench area at IR-12.

- 1,4-DCB exceeded its vapor intrusion criterion (2.1 µg/L) in 1 of 83 groundwater samples. The single exceedance (2.3 µg/L) was detected in a sample collected from well IR12MW17A in November 2004. 1,4-DCB was not detected above 1.9 µg/L in any of the eight preceding samples collected from this well (from 1992 to 2004).
- Benzene exceeded its vapor intrusion criterion (0.37 µg/L) in 11 of 83 groundwater samples collected from 2 A-aquifer wells (IR12MW13A and IR12MW17A). The table below summarizes the analytical results for benzene for these two A-aquifer wells, with the vapor intrusion criterion exceedances highlighted in bold.

Sampling Location	Sample Date	Benzene (µg/L)	Qualifier
IR12MW13A	08/26/1991	5	U
	02/24/1992	5	U
	09/22/1992	5	U
	03/21/2001	0.4	J
	06/27/2002	0.6	
	09/05/2002	0.48	J
	06/17/2004	0.36	J
	09/14/2004	0.29	J
	11/30/2004	0.36	J
IR12MW17A	8/19/1992	1	J
	9/24/1992	10	U
	3/22/1996	6	
	3/12/2001	3	
	7/19/2002	2.9	
	9/16/2002	4	
	6/10/2004	4.2	
	9/10/2004	3.3	J
	11/17/2004	7.8	

The 2004 benzene groundwater plume in Redevelopment Block 44, shown on Figure 4-4, was defined by the extent of benzene based on the 2004 quarterly groundwater monitoring data (see Table 4-4). The 2004 analytical results indicated that the plume was limited to an area around one well (IR12MW17A). The source of benzene in groundwater collected from this monitoring well is possibly associated with releases of waste fuels contained in drums crushed at the former drum crushing pad at IR-12.

- Chloroethane exceeded its vapor intrusion criterion (6.5 µg/L) in 1 of 83 groundwater samples. The single exceedance (7 µg/L) was detected in a sample collected from well IR12MW17A in March 1996. Chloroethane was not detected above 2 µg/L in any of the six subsequent samples collected from this well (from March 2001 to November 2004).
- Chloroform exceeded its vapor intrusion criterion (0.7 µg/L) in 3 of 83 groundwater samples. The three exceedances were detected in samples collected from well IR02MW97A in March 1991 (14 µg/L), January 1992 (12 µg/L), and August 1992 (3 µg/L). Chloroform was not detected in any of the three subsequent samples collected from this well (from March 2001 to September 2002).
- Naphthalene exceeded its vapor intrusion criterion (3.6 µg/L) in 1 of 66 groundwater samples. The single exceedance (8 µg/L) was detected in a sample collected from well IR12MW17A in March 1996 and was qualified as estimated because its concentration was below the PQL. Naphthalene was not detected in any of the three subsequent samples collected from this well (from June to November 2004).
- PCE exceeded its vapor intrusion criterion (0.54 µg/L) in 7 of 83 groundwater samples collected from 2 wells (IR12MW13A and IR12MW19A). PCE was only detected in one sample collected from well IR12MW13A (in June 2002), but was not detected in any of the four subsequent samples collected from this well from September 2002 through November 2004. The table below summarizes the analytical results for PCE for well IR12MW19A, with the vapor intrusion criterion exceedances highlighted in bold.

Sampling Location	Sample Date	PCE (µg/L)	Qualifier
IR12MW19A	08/19/1992	5	J
	09/25/1992	6.88	
	03/25/1996	6	
	03/12/2001	5	
	07/26/2002	3.8	
	09/11/2002	2.1	

The 2004 PCE groundwater plume in Redevelopment Block 44, shown on Figure 4-4, was defined by the extent of PCE based on the 2004 quarterly groundwater monitoring data (see Table 4-4). The source of PCE in groundwater collected from this monitoring well is possibly associated with wastes disposed of in the disposal trench area at IR-12.

- TCE exceeded its vapor intrusion criterion (2.9 µg/L) in 3 of 83 groundwater samples. The three exceedances were reported in samples collected from well IR02MW97A in March 2001 and well IR12MW19A from August 1992 through September 2002. TCE was not detected in any of the three preceding samples (in 1991 and 1992) or two subsequent samples (July and September 2002) collected from well IR02MW97A. TCE concentrations in the subsequent two samples collected from well IR12MW19A (July and September 2002) have not exceeded the vapor intrusion criterion.

Only 1,1-DCA, benzene, and PCE in A-aquifer groundwater at Redevelopment Block 44 are discussed further in Section 4.3.6.5.

Semivolatile Organic Compounds

Samples collected from the A-aquifer wells associated with Redevelopment Block 44 were analyzed for SVOCs during one or more rounds of sampling; six SVOCs were detected. Of the six SVOCs detected, none exceeded the appropriate screening criteria (vapor intrusion criteria and surface water criteria). As a result, SVOCs in A-aquifer groundwater at Redevelopment Block 44 are not discussed further in this section.

Cyanide

Samples collected from the A-aquifer wells associated with Redevelopment Block 44 were analyzed for cyanide during one or more rounds of sampling. Cyanide was detected in 2 of 23 samples. Neither of the two cyanide detections exceeded the appropriate screening criterion (surface water criterion). As a result, cyanide is not discussed further in this section.

Pesticides

Samples collected from the A-aquifer wells associated with Redevelopment Block 44 were analyzed for pesticides during one or more rounds of sampling; 11 pesticides were detected (see Table 4.3.6-3). All but two of the detections were qualified as estimated because the concentrations were below the PQL. Of the 11 pesticides detected, 3 pesticides (4,4'-DDT, gamma-chlordane, and heptachlor epoxide) exhibited concentrations exceeding surface water criteria. The exceedances occurred in two wells (IR02MW97A and IR12MW17A) in samples collected in January 1992, August 1992, March 2001, and September 2004. 4,4-DDT was detected twice in samples collected from well IR02MW97A in January and August 1992, at concentrations of 0.2 and 0.06 µg/L, and once in samples collected from well IR12MW17A in March 2001, at a concentration of 0.008 µg/L. 4,4-DDT was not detected in five samples from

IR12MW17A since 2001. Gamma-chlordane and heptachlor epoxide were each detected only once. Based on the relatively few samples with exceedances of surface water criteria, the low levels that were detected (all detections except two were estimated quantities), and the historical nature of these detections, the nature and extent of the individual pesticides is not discussed further in this section.

Total Petroleum Hydrocarbons

Samples collected from the A-aquifer wells associated with Redevelopment Block 44 were analyzed for TPH products during one or more rounds of sampling. TPH-g, TPH-d, and TPH-mo were detected in groundwater samples collected from two, four, and two A-aquifer wells, respectively. The maximum concentrations detected of each TPH range varied from 490 to 3,000 µg/L (see Table 4.3.6-3). These maximum concentrations were all less than the TPH screening criteria for groundwater (as shown in Table 4-1). As a result, TPH products in A-aquifer groundwater at Redevelopment Block 44 are not discussed further in this section.

4.3.6.4.2 Extent of Chemicals in Groundwater

The screening process identified three areas within Redevelopment Block 44 where concentrations of chemicals in A-aquifer groundwater consistently exceeded Parcel E screening criteria:

- Monitoring well IR12MW18A: Nickel (see Figure 4-3 and Table 4-3)
- Monitoring well IR12MW19A: 1,1-DCA and PCE (see Figure 4-4 and Table 4-4)
- Monitoring well IR12MW17A: Benzene (see Figure 4-4 and Table 4-4)

The source of nickel, 1,1-DCA, and PCE in A-aquifer groundwater is possibly related to wastes disposed of in the disposal trench area at IR-12. The source of benzene in A-aquifer groundwater is possibly related to releases of waste fuels contained in drums crushed at the former drum crushing pad at IR-12.

4.3.6.5 Evaluation of Chemical Fate and Transport

As described in Sections 4.3.6.3 and 4.3.6.4, three areas were identified where soil sampling results exceeded Parcel E soil screening criteria and three wells were identified where groundwater sampling results exceeded Parcel E groundwater screening criteria in Redevelopment Block 44. Chemicals identified in areas exceeding Parcel E screening criteria in soil are metals (arsenic and lead); VOCs (naphthalene); SVOCs; PCBs; and TPH. Nickel, 1,1-DCA, benzene, and PCE were identified in groundwater exceeding Parcel E screening criteria. The persistence and mobility of these chemicals in soil and groundwater is discussed below.

Metals

Arsenic and Lead

The mobility of arsenic and lead are highly dependant on soil pH and infiltration of water. Soil pH within Redevelopment Block 44 ranges from 5.6 to 9.7 (see Appendix C). Average pH calculated as described in Section 4.3.2.5 is 7.3. Of 153 pH measurements for soil, only six were below 7.0. The predominantly above-neutral pH values measured in the vadose zone soil samples indicate that site conditions do not favor leaching of these metals into groundwater (see Appendix H). Although arsenic may be somewhat mobile in the basic soils, its concentrations in groundwater have not exceeded Parcel E screening criteria. Concentrations of lead in groundwater also have not exceeded Parcel E screening criteria. Therefore, the migration of arsenic, copper, and lead from the vadose zone soils to groundwater appears limited.

Nickel

Nickel is readily weathered in soil environments and the nickel salts of nitrate, chloride, and sulfate are all water soluble and significant levels of these anions will enhance nickel mobility. In water, nickel may form soluble compounds with various ions, suggesting the increased mobility of nickel.

The extent of the 2004 nickel plume in groundwater is limited to the area of well IR12MW18A based on the maximum concentrations detected during the two most recent quarters of data in the RI data set for Redevelopment Block 44. The 2004 plume is estimated to be about 1,000 feet away from the shoreline. As a result, the potential for nickel-contaminated groundwater to reach the Bay waters is low.

Volatile Organic Compounds

1,1-Dichloroethane

1,1-DCA has high tendency to volatilize due to high vapor pressure. 1,1-DCA may biotransform under both aerobic and anaerobic conditions however biodegradation under aerobic conditions is limited. 1,1-DCA is expected to biodegrade because anaerobic conditions are present at or near the groundwater level at Redevelopment Block 44. 1,1-DCA is likely to move downgradient along with groundwater because it has (1) a high solubility in water and (2) a high tendency to readily migrate with flowing groundwater. 1,1-DCA concentrations in groundwater at two wells (IR12MW17A and IR12MW19A) appeared to decrease over time. As a result, the potential for continued migration of 1,1-DCA with groundwater is limited.

Benzene

Benzene is highly soluble and has a relatively high vapor pressure. Based on an average TOC content of 2.5 percent in soil from 0 to 10 feet bgs at Redevelopment Block 44, sorption of benzene to soil can be significant (see Section 4.2). However, the sorption of dissolved benzene to soils or aquifer materials is not expected to substantially affect its potential to migrate. The predominant soil type in the vadose zone across Redevelopment Block 44 is Artificial Fill comprising clayey and silty sand, gravel, and boulder fill. Therefore, the potential for chemicals to reach the water table or migrate to air is high (see Section 4.2). The benzene exceedances in groundwater at Redevelopment Block 44 suggest that benzene may have migrated from soil to groundwater. Currently, the direction of groundwater flow at Redevelopment Block 44 is toward the east. After the utility lines are removed, the groundwater flow direction may gradually shift toward the Bay. However, the 2004 plume is about 800 feet away from the Bay and the potential for benzene to migrate toward the Bay is expected to be limited (see Figure 4-4).

Naphthalene

Naphthalene was detected at concentrations exceeding Parcel E screening criteria in a few samples collected from locations north of Building 600. Based on an average TOC content of 2.5 percent in soil from 0 to 10 feet bgs at Redevelopment Block 44, the mobility of naphthalene in soil and sediments would be limited because it has (1) a low solubility in water, (2) a relatively low vapor pressure, and (3) a tendency to strongly sorb to organic in soil. As a result, naphthalene is not expected to leach to groundwater at Redevelopment Block 44.

Tetrachloroethene

Tetrachloroethene was detected at concentrations exceeding Parcel E screening criteria in groundwater in samples from two wells (IR12MW13A and IR12MW19A). Tetrachloroethene concentrations have not exceeded screening criteria in samples from well IR12MW13A since 2002. Tetrachloroethene concentrations have been decreasing over time at well IR12MW19A. Tetrachloroethene is expected to remain dissolved in groundwater and be transported downgradient because of its high solubility (see Appendix H). Tetrachloroethene has a high tendency to volatilize because of high vapor pressure. Infiltration into groundwater is likely an important migration mechanism for tetrachloroethene at Redevelopment Block 44, although tetrachloroethene has a tendency to sorb to soils. The estimated 2004 tetrachloroethene plume is more than 1,000 feet away from the Bay and is expected to remain stable in the future because of a decreasing concentration trend (see Figure 4-4).

Semivolatile Organic Compounds

Benzo(a)pyrene was detected in shallow soil, as well as in deeper depths (saturated soil) at concentrations exceeding Parcel E screening criteria; PAHs did not exceed screening criteria in groundwater. Based on an average TOC content of 2.5 percent in soil from 0 to 10 feet bgs at Redevelopment Block 44, the mobility of benzo(a)pyrene to soil would be very limited because it has (1) a very low solubility in water, (2) a low vapor pressure, and (3) a high tendency to strongly sorb to organic carbon in soil. As a result, the potential for benzo(a)pyrene to migrate from the vadose zone into groundwater is relatively low.

Polychlorinated Biphenyls

Aroclor-1260 was detected in surface (0 to 10 feet bgs) soil samples at concentrations exceeding Parcel E screening criteria at Redevelopment Block 44. Aroclor-1260 has very low solubility and low vapor pressure because of a high level of chlorination (see Appendix H) and a tendency to strongly sorb to organic carbon in soil. As a result, the potential for Aroclor-1260 to migrate from the vadose zone into groundwater is relatively low.

Total Petroleum Hydrocarbons

The detections of TPH noted for further evaluation are associated with TPH-gasoline, -diesel, and -motor oil range. Petroleum hydrocarbons are known to sorb to soil and have low to moderate solubilities in water. Based on the average TOC content of 2.5 percent in soil from 0 to 10 feet bgs at Redevelopment Block 44, the mobility of TPH in soil is expected to be limited because of sorption to organic carbon in soil. As a result, it is expected that the migration of petroleum hydrocarbons from soil to groundwater and the continued migration with groundwater would be limited.

4.3.7 Redevelopment Block 45

This section summarizes the site characterization of Redevelopment Block 45, including the site history (see Section 4.3.7.1), the geology and hydrogeology (see Section 4.3.7.2), the nature and extent of chemicals in soil (see Section 4.3.7.3), the nature and extent of chemicals in groundwater (see Section 4.3.7.4), and the fate and transport of chemicals in soil and groundwater (see Section 4.3.7.5). The planned reuse for this block is research and development. No tenants are currently present on this redevelopment block.

4.3.7.1 Site History

Redevelopment Block 45 is located in the northern portion of Parcel E. This block includes four IR sites: all of IR-04, a portion of IR-12, and all of IR-56 and IR-72. Site features within Redevelopment Block 45 are shown on Figure 1-13. The subsections below discuss the history of each IR site (IR-04, IR-12, IR-56, and IR-72) within the boundaries of Redevelopment Block 45.

4.3.7.1.1 IR-04

IR-04 is located in the central portion of Redevelopment Block 45. IR-04 covers approximately 5.2 acres and consists of the scrap yard and scrap material area (see Figure 1-13).

Approximately 2 acres of IR-04 comprise the scrap yard and the scrap material area. The scrap yard is a rectangular area west of the intersection of Spear and Crisp Avenues and the scrap material area extends southwest of the scrap yard along a railroad spur. The southern portion of

Triple A Site 3 is within the scrap yard and extends approximately 130 feet north into IR-72. No buildings are present on IR-04. A railroad spur runs the length of the site.

From 1954 to 1974, the Navy operated the scrap yard at IR-04 (NEESA 1984). The Navy stored used submarine batteries, electrical capacitors, and steel at the scrap yard. In 1984, the Navy investigated the scrap yard as IAS Site 5 during the IAS conducted at HPS. According to the IAS, approximately 7,000 pounds of lead and copper residue, and up to 250 gallons of PCB-containing oil, may have been released onto the pavement and soil during the handling, crushing, and storage of batteries and electrical capacitors at the scrap yard (NEESA 1984).

Triple A occupied HPS from May 1976 through June 1986. During Triple A's occupancy, scrap metal and other debris were stored at the scrap yard (HLA 1988d). An investigation by the SFDA indicated that the debris included drums, pipe lagging, batteries, liquid wastes, and scrap metal (SFDA 1986). Stained soil was also observed at the site.

In a 1984 aerial photograph, scrap material is visible along the railroad tracks southwest of the scrap yard, in the scrap material area. Aerial photographs taken in the late 1970s show automobiles and other unknown debris stored in this mostly unpaved area (HLA 1988d).

Portions of the IR-04 area are within the former Golden Gate Railroad Museum yard. The area is fenced and was used as a storage area for railroad cars and engines and other equipment.

4.3.7.1.2 IR-12

A portion of IR-12 is located in the southwest portion of Redevelopment Block 45. The northeast half of IR-12, including the northern portion of Triple A Site 3 (also known as the salvage yard), is located in Redevelopment Block 45 (see Figure 1-13). The remainder of IR-12 lies within Redevelopment Block 44.

The salvage yard was used by the Navy and Triple A to store equipment for reuse. Triple A allegedly engaged in scrap metal stripping operations involving electrical cable, pipe lagging, and motor vehicles. Spilled oil and liquid chemicals were observed on the ground and some of these liquids appeared to have run directly into a storm drain in the salvage yard. Drums, batteries, wire insulation, and asbestos lagging were also observed at the salvage yard while Triple A occupied HPS (SFDA 1986).

4.3.7.1.3 IR-56

IR-56 is located in the northern portion of Redevelopment Block 45. IR-56 covers approximately 4.3 acres and consists of the following site features (see Figure 1-13):

- Building 809
- Area West of Building 809
- Railroad Yard Area

Building 809

Building 809 is located along the southern boundary of IR-56; therefore, it is considered part of IR-56. This building was constructed in 1943 and was formerly used as a lumber storehouse (PRC 1996c). Building 809 is constructed of wood and encompasses an area of 11,159 square feet (PRC 1996c). In addition to lumber, other materials formerly stored in Building 809 include generators and drums and buckets of hydraulic fluids, bituminous solvent, and transmission fluid (ERM-West 1988). During the 1988 Fence-to-Fence Survey, materials observed in a storage area east of Building 809 consisted of a drum of cleaning solution, parts of a tank used to store PCBs, and storage tanks containing residual sand (ERM-West 1988). In June 2005, Building 809 housed the Golden Gate Railroad Museum (Navy 2005b); railroad cars were displayed and restored in the building. Railroad car parts and restoration materials were stored in and around Building 809. As of June 2007, Building 809 was vacant (Tetra Tech 2007a).

Area West of Building 809

The area west of Building 809 was part of an open storage yard area located primarily at IR-72. Materials formerly stored in this area consisted of scrap metal, lumber, motors, batteries, hydraulic fluid, waste oil, propane, hydrochloric acid, and unlabeled drums of liquid (HLA 1994c). The storage yard area was covered with patchy asphalt and gravel, and surface spills and leaks were observed in this area (HLA 1994c). During the SA conducted in 1993, a shallow drainage trench containing oily liquid was observed about 250 feet west of Building 809; this trench led to a nearby storm drain (HLA 1994c). In addition, an area of stained soil was observed on the ground surface about 100 feet west of Building 809 (HLA 1994c).

Railroad Yard Area

The railroad yard area at IR-56 was formerly used for transport and storage of lumber (PRC 1996c). The historical uses of this area suggest the possible use of wood preservatives associated with lumber operations and railroad ties. The area may also have been used to clean railroad parts with solvents. During the 1988 Fence-to-Fence Survey, two closed boxcars were observed along the railroad track near the northeast corner of Building 809; these boxcars were used to store an estimated 14,500 gallons of paints and solvents (ERM-West 1988). Surveyors noted evidence of paint leakage on the boxcar floors and a strong odor outside the boxcars (ERM-West 1988).

4.3.7.1.4 IR-72

IR-72 consists of a former storage yard and is located in the central portion of Redevelopment Block 45. IR-72 covers approximately 2.7 acres and consists of the following site features within Redevelopment Block 45 (see Figure 1-13):

- Building 810
- Area West of Building 810
- Building 811
- USTs S-801 and S-802
- Triple A Site 3

Building 810

Building 810 is a wooden building with a paved floor about 100 feet by 200 feet in size that is located along the southern boundary of IR-72. The building was constructed in 1943 (PRC 1996c). Sometime between 1943 and 1974, the Navy used Building 810 as a storehouse for paint and oil (PRC 1996c). Between 1974 and 1988, commercial tenants used Building 810 to store drums of liquid waste, including pesticides, herbicides, and corrosives (ERM-West 1988). After 1988, Building 810 was used to temporarily store drums of investigation-derived waste (IDW) generated during HPS RI activities prior to their shipment off site for disposal. These drums contained soil cuttings from HPS, as well as solvents, petroleum hydrocarbons, and acids; only a few minor spills were observed within Building 810 (HLA 1994c). Sometime after 1993, the IDW storage area was moved to Building 130 at Parcel B; Building 810 is currently vacant. Along the north side of Building 810, a carport overhang covered an area used to store equipment, batteries, and drums of oil (HLA 1994c).

Area West of Building 810

An open area west of Building 810 that is covered with patchy asphalt and gravel was used as a storage yard for scrap metal, lumber, motors, batteries, hydraulic fluid, waste oil, propane, hydrochloric acid, and unlabeled drums of liquid (HLA 1994c). Several drum storage sheds with wooden floors, one drum storage shed with an unpaved floor, and an AST used to store PCB-containing waste oil were present in the storage yard (HLA 1994c). During the 1994 SA, surface spills and leaks were observed in the storage yard area. The AST was removed; however, the date of removal is unknown.

Building 811

Building 811, a diesel station used to fuel train engines, is located in the northeastern portion of IR-72 about 110 feet east of Building 810. The building was constructed in 1943 and consists of a square, wooden, raised platform about 25 by 25 feet in dimension adjacent to a rail line (PRC 1996c). Building 811 is not currently in use.

USTs S-801 and S802

USTs S-801 and S-802 were located side-by-side south of Building 811 (PRC 1996c). Each 10,000-gallon steel UST was used to store gasoline. The surface cover above the USTs was soil. Because of their close proximity to an active electrical substation, USTs S-801 and S-802 could not be removed and were closed in place in 1991 during Phase I of the UST program at HPS.

Triple A Site 3

During its tenancy between 1976 and 1986, Triple A allegedly expanded the former Navy scrap yard area to include a portion of IR-72 east of Building 810. During the 1986 SFDA investigation of Triple A's hazardous waste disposal practices, the scrap yard and the additional IR-72 area were designated as Triple A Site 3. Triple A allegedly used the scrap yard for storage of scrap metal, drums, batteries, asbestos-containing pipe lagging material, and liquid waste (SFDA 1986). Oil and other liquid wastes were reportedly spilled on the ground at Triple A Site 3; some of these liquid wastes apparently entered a storm drain at IR-72 (SFDA 1986). In addition, soil staining was observed at the site (SFDA 1986).

4.3.7.2 *Geology and Hydrogeology*

This section briefly discusses the main geological and hydrogeological features that exist beneath Redevelopment Block 45. A full description of geology and hydrogeology at Parcel E is presented in Section 3.4 and 3.5, respectively.

Asphalt and concrete paving cover most of Redevelopment Block 45 except along the southern boundary, which is covered by gravel and broken asphalt with vegetation. From the surface downward, the geologic units at Redevelopment Block 45 consist of Artificial Fill, Undifferentiated Upper Sand Deposits, Bay Mud Deposits, Undifferentiated Sedimentary Deposits, and Franciscan Complex bedrock.

Artificial Fill at Redevelopment Block 45 consists mainly of clayey and silty sand, sandy clays, gravel, and serpentinite boulder fill, and ranges from 13 to 30 feet thick. The Undifferentiated Upper Sand Deposits consist of silty and poorly graded sand with shell fragments, and ranges from 0 to 7 feet thick. The Bay Mud Deposits consist of fat clay, with varying proportions of sand and silt and minor amounts of shell fragments, that ranges from 0 to 20 feet thick and is absent in the northeast portion of Redevelopment Block 45. The depth to bedrock ranges from 4 to 125 feet bgs. Bedrock consists of serpentinite of the Franciscan Complex.

The hydrostratigraphy beneath Redevelopment Block 45 consists of an A-aquifer, an aquitard, and a B-aquifer. The A-aquifer consists of Artificial Fill and Upper Differentiated Sand Deposits. Based on average groundwater elevations measured in A-aquifer wells, the depth to groundwater in the A-aquifer ranges from 7.3 to 12.9 feet bgs throughout this redevelopment block. Groundwater flow in the A-aquifer at Redevelopment Block 45 is generally east (see Figure 3-10). The groundwater flow direction in this area is suspected to be influenced by pumping at sanitary sewer Pump Station A. The B-aquifer is separated from the A-aquifer by the Bay Mud aquitard and low-permeable materials of Artificial Fill and is absent where bedrock is close to the ground surface along the northeast border of Redevelopment Block 45 (see Figure 3-16). The general direction of groundwater flow for the B-aquifer is approximately southeast (see Figures 3-12 and 3-13).

4.3.7.3 Nature and Extent of Chemicals in Soil

This section summarizes the evaluation of the nature and extent of chemicals in soil within the boundary of Redevelopment Block 45. The evaluation follows the approach for identifying chemicals and their spatial extent described in Section 4.1.

4.3.7.3.1 Identification and Spatial Distribution of Chemicals in Soil

This section summarizes the chemicals identified in soil at Redevelopment Block 45. Approximately 449 samples were collected at Redevelopment Block 45. Figure 4.3.7-1 shows the locations where soil samples were collected from Redevelopment Block 45. Soil samples were analyzed for metals (including hexavalent chromium), VOCs, SVOCs (including PAHs), cyanide, pesticides, PCBs, and TPH.

Tables 4.3.7-1 and 4.3.7-2 present the summary statistics for chemicals that were detected at concentrations exceeding the residential soil screening criteria. Tables 4.3.7-1 presents statistics for 247 surface (0 to 10 feet bgs) soil samples; Tables 4.3.7-2 presents statistics for 176 subsurface (deeper than 10 feet bgs) soil samples. Appendix C includes the complete soil data set used to generate the summary statistics tables for this redevelopment block.

The chemicals detected in soil are described below by analytical group: metals, VOCs, SVOCs, cyanide, pesticides, PCBs, and TPH.

Metals

The risk due to metals is primarily in the upper 10 feet of soil (see Appendix I); therefore, this discussion focuses on the data for metals in surface soil samples. Twenty-four metals were detected in soil samples collected from the surface to a depth of 10 feet bgs. Of the 24 metals detected, 13 metals were detected at concentrations exceeding the residential soil screening criteria.

The lateral extent of elevated concentrations of metals was evaluated to identify areas within Redevelopment Block 45 exceeding Parcel E residential screening criteria in soil. Figure 4.3.7-2 shows the sampling locations where concentrations of metals exceeded Parcel E residential screening criteria and presents the elevated concentrations at each location. Concentrations of the metals exceeded the screening criteria in soil at the following contiguous sampling locations:

- Northwest of Building 809
- South of Building 810 (IR-04)
- Northwest of Building 810
- Northeast of Building 810

Elevated concentrations of metals are found throughout Redevelopment Block 45, as shown on Figure 4.3.7-2.

The area northwest of Building 809 was used to store materials including lumber, generators, drums and buckets of hydraulic fluids, bituminous solvent, and transmission fluid (ERM-West 1988). Site activities may have resulted in elevated concentrations of metals. The area south of Building 810 coincides with the scrap yard along a railroad spur. Activities related to operation of the scrap yard may have resulted in releases of metals. The area northwest of Building 810 coincides with a storage yard for scrap metal, batteries, waste oil, PCB waste, and other materials (HLA 1994c). The storage practices may have resulted in elevated concentrations of metals. The area northeast of Building 810 coincides with the use of the railroad spur in IR-56.

Volatile Organic Compounds

Nineteen VOCs were detected in soil samples collected from the surface soil (0 to 10 feet bgs); no VOCs were detected at concentrations exceeding the Parcel E residential screening criteria. Fifteen VOCs were detected in soil samples collected deeper than 10 feet bgs; only naphthalene was detected at a concentration exceeding the Parcel E residential screening criteria, in one sample. As a result, the nature and extent of VOCs in soil at Redevelopment Block 45 is not discussed further in this section.

Semivolatile Organic Compounds

Twenty-two SVOCs were detected in one or more soil samples collected from the surface to 10 feet bgs. However, only 8 of the 22 SVOCs were detected at concentrations exceeding Parcel E residential screening criteria, two of which exceeded the Parcel E industrial screening criteria (see Tables 4.3.7-1). Fifteen SVOCs were detected in samples deeper than 10 feet bgs; however, only 6 of the 15 SVOCs were detected at concentrations exceeding Parcel E residential screening criteria; 3 SVOCs exceeded Parcel E industrial screening criteria (see Tables 4.3.7-2).

The lateral extent of elevated concentrations of SVOCs was evaluated to identify areas within Redevelopment Block 45 where SVOCs exceeded Parcel E residential screening criteria in soil. Figure 4.3.7-3 shows the sampling locations where concentrations of SVOCs exceeded Parcel E residential screening criteria and presents the elevated concentrations at each location. The SVOC concentrations exceeded screening criteria in soil at contiguous sampling locations northwest of Building 810. SVOCs were detected at several isolated locations with concentrations exceeding the screening criteria; none of the results for isolated locations are indicative of a source area.

The area northwest of Building 810 coincides with a storage yard for scrap metal, batteries, waste oil, PCB waste, and other materials (HLA 1994c). The storage practices may have resulted in elevated concentrations of SVOCs.

Cyanide

Cyanide was detected in 28 percent of soil samples collected from surface soil (0 to 10 feet bgs); however, none of the detected concentrations exceeded the Parcel E residential screening criterion (see Table 4.3.7-1). Cyanide was detected in two of nine soil samples collected deeper than 10 feet bgs (see Table 4.3.7-2); however, none of the detected concentrations exceeded the Parcel E residential screening criterion. As a result, the nature and extent of cyanide in soil at Redevelopment Block 45 is not discussed further in this section.

Pesticides

Thirteen pesticides were detected in soil samples collected from surface soil (0 to 10 feet bgs); however, only dieldrin was detected in one sample at concentrations exceeding the Parcel E residential screening criterion (see Tables 4.3.7-1). Three pesticides were detected in soil samples collected deeper than 10 feet bgs (see Tables 4.3.7-2); however, none of the detected concentrations exceeded the Parcel E residential screening criteria (see Figure 4.3.7-4). As a result, the nature and extent of pesticides in soil at Redevelopment Block 45 is not discussed further in this section.

Polychlorinated Biphenyls

Two PCBs were detected in soil samples collected from surface soil (0 to 10 feet bgs); however, only one PCB was detected at concentrations exceeding the Parcel E residential screening criteria (see Tables 4.3.7-1). One PCB was detected in one soil sample collected from greater than 10 feet bgs at a concentration exceeding the Parcel E residential screening criteria (see Tables 4.3.7-2).

The lateral extent of elevated concentrations of PCBs was evaluated to identify areas within Redevelopment Block 45 where PCBs exceeded Parcel E residential screening criteria in soil. Figure 4.3.7-4 shows the sampling locations where concentrations of PCBs exceeded Parcel E residential screening criteria and presents the elevated concentrations at each location.

Concentrations of PCBs exceeded the screening criteria in soil at contiguous sampling locations south of Building 810 (IR-04). Concentrations at several isolated locations also exceeded the screening criteria; none of the isolated locations of PCBs indicates a source area.

The area south of Building 810 coincides with the scrap yard along a railroad spur. Activities related to operation of the scrap yard may have resulted in releases of PCBs.

Total Petroleum Hydrocarbons

TPH concentrations exceeded the screening criteria in 13 samples; several of the locations were collocated with CERCLA chemicals. No free product was detected in monitoring wells within this redevelopment block (Tetra Tech 2002c).

The lateral extent of elevated concentrations of TTPH was evaluated to identify areas within Redevelopment Block 45 where TTPH exceeded the soil source screening criterion in soil. Figure 4.3.7-4 shows the sampling locations where concentrations of TTPH exceeded the soil source screening criterion and presents the elevated concentrations at each location. Concentrations of TTPH exceeded the screening criteria in soil at contiguous sampling locations along the southern border of Redevelopment Block 45.

This area (the southern border of Redevelopment Block 45) has elevated concentrations of TTPH, though it is not collocated with the areas with elevated concentrations of metals, SVOCs, or PCBs and is addressed under the Navy's TPH program as CAA6. The TPH concentration at one isolated location is associated with CAA10. Concentrations at three isolated locations outside these CAAs also exceeded the screening criteria. The non-CAA isolated concentrations are collocated with metals and PCBs.

4.3.7.3.2 Extent of Chemicals in Soil

Five areas were identified within Redevelopment Block 45 where concentrations of chemicals in soil at contiguous sampling locations exceeded Parcel E residential screening criteria:

- Area northwest of Building 809: metals and SVOCs (see Figures 4.3.7-2 and 4.3.7-3)
- Area northwest of Building 810: metals, SVOCs and pesticides (see Figures 4.3.7-2, 4.3.7-3, and 4.3.7-4)
- Area south of Building 810: metals and PCBs (see Figures 4.3.7-2 and 4.3.7-4)
- Area northeast of Building 810: metals and SVOCs (see Figures 4.3.7-2 and 4.3.7-3)
- Southern border of Redevelopment Block 45: TTPH (see Figure 4.3.7-4)

The area northwest of Building 809 was formerly used to store lumber (HLA 1994c). In addition to lumber, other materials formerly stored in Building 809 included generators and drums and buckets of hydraulic fluids, bituminous solvent, and transmission fluid (ERM-West 1988). Site activities may have resulted in elevated concentrations of metals and SVOCs. The estimated size of the area is 250 feet (east-west) by 175 feet (north-south). The depth to groundwater is 12.9 feet bgs.

The area northwest of Building 810 coincides with a storage yard for scrap metal, batteries, waste oil, PCB waste, and other materials (HLA 1994c). The storage practices may have resulted in elevated concentrations of metals, SVOCs, and pesticides. The estimated size of the area is 150 feet (east-west) by 100 feet (north-south). The depth to groundwater is 8.6 feet bgs.

The area south of Building 810 coincides with the scrap yard along a railroad spur in IR-04. Activities related to operation of the scrap yard may have resulted in releases of metals, SVOCs, and PCBs. It is assumed that the area exceeding Parcel E screening criteria is primarily located along the railroad spur. The estimated size of the area is 600 feet (east-west) by 100 feet (north-south). The depth to groundwater is 8.6 feet bgs.

The area northeast of Building 810 coincides with the use of the railroad spur in IR-56. The estimated size of the area is 200 feet (east-west) by 100 feet (north-south). The depth to groundwater is 8.6 feet bgs.

The southern border of Redevelopment Block 45 has elevated concentrations of TTPH, though it is not collocated with the areas with elevated concentrations of metals, SVOCs, or PCBs and is addressed under the Navy's TPH program as CAA6.

4.3.7.4 Nature and Extent of Chemicals in Groundwater

This section summarizes the evaluation of the nature and extent of chemicals detected in groundwater samples collected from monitoring wells associated with Redevelopment Block 45. Figure 4.3.7-5 shows the locations of the groundwater monitoring wells associated with Redevelopment Block 45 where groundwater samples were collected for this evaluation.

Table 4.3.7-3 presents the summary statistics for chemicals that were detected in samples collected from the A-aquifer wells. No B-aquifer wells or bedrock water-bearing zone wells are associated with Redevelopment Block 45. Chemicals that were retained for evaluation based on consideration of the factors described in Section 4.1.2.2 are shaded and shown in bold font in this table. Appendix D includes the complete groundwater data set for this redevelopment block.

4.3.7.4.1 Chemicals in A-Aquifer Groundwater

Fifteen A-aquifer wells are associated with Redevelopment Block 45 (see Figure 4.3.7-5), including 2 wells located just outside the northwestern and southeastern border of the redevelopment block. Groundwater samples collected from the A-aquifer wells were analyzed

for metals (including hexavalent chromium), VOCs, SVOCs, cyanide, pesticides, PCBs, and TPH. Cyanide was not detected in any groundwater samples collected from these A-aquifer wells; therefore, this chemical is not discussed further in this section.

The chemicals that were detected in groundwater samples collected from the A-aquifer are evaluated below by analytical group: metals, VOCs, SVOCs, pesticides, PCBs, and TPH.

Metals

Samples collected from the A-aquifer wells associated with Redevelopment Block 45 were analyzed for metals during one or more rounds of sampling; 23 metals were detected. Of the 23 metals detected, 6 metals (arsenic, cadmium, copper, lead, nickel, and zinc) exceeded the appropriate screening criterion (surface water criteria, or HGALs if than surface water criteria). The spatial and temporal distributions of these six metals are discussed below.

- Arsenic exceeded its surface water criterion (36 µg/L) and its HGAL (27.34 µg/L) in only one groundwater sample, collected from IR12MW21A in September 1992, with a concentration of 37.4 µg/L. This well is located approximately 1,100 feet from the Bay. Arsenic was not detected (less than 3 µg/L) in the two subsequent samples collected from IR12MW21A in April and May 1996.
- Cadmium exceeded its surface water criterion (8.8 µg/L) and its HGAL (5.08 µg/L) in only one groundwater sample, collected from IR04MW40A in 1991, with a concentration of 13 µg/L. This well is located approximately 1,000 feet from the Bay. Cadmium was not detected above a concentration of 2.57 µg/L in the five subsequent samples collected from IR04MW40A from February 1992 to September 2002.
- Copper exceeded its surface water criterion (3.1 µg/L) and its HGAL (28.04 µg/L) in only one groundwater sample, collected from PA50MW10A in 1996, with a concentration of 275 µg/L (248 µg/L in the duplicated sample). This well is located approximately 1,600 feet from the Bay. Copper was not detected above a concentration of 8 µg/L in the three subsequent samples collected from well PA50MW10A (in March 2001, July 2002, and September 2002).
- Lead exceeded its surface water criterion (5.6 µg/L) and its HGAL (14.44 µg/L) in 2 of 52 groundwater samples. The two exceedances were detected in samples collected from well IR04MW40A in February 1992 (15.4 µg/L) and well PA50MW10A in November 1996 (133 µg/L in the original sample and 81.6 µg/L in the duplicate sample). These wells are both located over 1,000 feet from the Bay. Lead was only detected in one of the subsequent four samples collected from well IR04MW40A from 1992 to 2002, at an estimated concentration of 0.142 µg/L. Lead was not detected in the subsequent three samples collected from well PA50MW10A in 2001 and 2002.

- Nickel exceeded its surface water criterion (8.2 µg/L) and its HGAL (96.48 µg/L) in only one groundwater sample, collected from IR04MW40A in November 1991 (250 µg/L in the original sample and 302 µg/L in the duplicate sample). This well is located approximately 1,100 feet from the Bay. Nickel was not detected above 56.5 µg/L in the subsequent five samples collected from well IR04MW40A (from February 1992 through September 2002).
- Zinc exceeded its surface water criterion (81 µg/L) and its HGAL (75.68 µg/L) in only one groundwater sample, collected from PA50MW10A in November 1996 (396 µg/L in the original sample and 344 µg/L in the duplicate sample). This well is located approximately 1,600 feet from the Bay. Zinc was not detected above 4.3 µg/L in the subsequent three samples collected from well PA50MW10A (in March 2001, July 2002, and September 2002).

Metals in A-aquifer groundwater at Redevelopment Block 45 are not discussed further in this section.

Volatile Organic Compounds

Samples collected from the A-aquifer wells associated with Redevelopment Block 45 were analyzed for VOCs during one or more rounds of sampling; 23 VOCs were detected. Of the 23 VOCs detected, 7 VOCs (1,4-DCB, benzene, chloroform, isopropylbenzene, naphthalene, PCE, and TCE) exceeded at least one of the appropriate screening criteria (vapor intrusion and surface water criteria). The spatial and temporal distributions of these seven VOCs are discussed below.

- 1,4-DCB exceeded its vapor intrusion criterion (2.1 µg/L) in only one groundwater sample, collected from well IR12MW14A in June 2002, with a concentration of 19 µg/L. 1,4-DCB was not detected above 0.5 µg/L in any of the four subsequent samples collected from this well (from September 2002 through December 2004).
- Benzene exceeded its vapor intrusion criterion (0.37 µg/L) in 5 of 86 groundwater samples collected from 3 A-aquifer wells (IR12MW15A, IR12MW21A, and IR56MW39A). Benzene was detected at concentration of 1.3 µg/L in a sample collected from well IR12MW15A in September 2002 (1.2 µg/L in the duplicate sample), but was not detected in the preceding three samples collected from this well in 1991, 1992, and 2002. Benzene was detected twice in samples collected from well IR12MW21A (April and May 1996), but was not detected in the only subsequent sample collected from this well in April 2002. Benzene has most frequently been detected in samples collected from well IR56MW39A (five times), although detected benzene concentrations in the seven samples collected from this well subsequent to 1996 have not exceeded the vapor intrusion criteria.

- Chloroform exceeded its vapor intrusion criterion (0.7 µg/L) in 2 of 84 groundwater samples from A-aquifer wells IR74MW01A (0.8 µg/L) and PA50MW10A (2 µg/L), both in November 1996. Chloroform has not been detected above the 0.5 µg/L in the three subsequent samples collected from well IR74MW01A in 2004, or the three subsequent samples collected from well PA50MW10A in 2001 and 2002.
- Isopropylbenzene exceeded its vapor intrusion criterion (7.8 µg/L) in only one groundwater sample, collected from well IR56MW39A in August 2002, with a concentration of 12 µg/L. Isopropylbenzene was detected at an estimated concentration of 2.5 µg/L in the only subsequent sample collected from this well in September 2002.
- Naphthalene exceeded its vapor intrusion criterion (3.6 µg/L) in 2 of 54 groundwater samples, collected from well IR56MW39A in November 1994 and March 1996, with concentrations of 15 and 27 µg/L. Naphthalene was not detected in any of the four subsequent samples collected from this well (from May 1996 through November 2004).
- PCE exceeded its vapor intrusion criterion (0.54 µg/L) in only one groundwater sample, collected from well IR12MW14A in June 2002, with a concentration of 56 µg/L. PCE was not detected in any of the four subsequent samples collected from this well from September 2002 through December 2004. The 2004 PCE groundwater plume in Redevelopment Block 45, shown on Figure 4-4, was defined by the extent of PCE based on the 2004 quarterly groundwater monitoring data (see Table 4-4). The 2004 PCE plume in this area is discussed further in Section 4.3.6.4 for Redevelopment Block 44.
- TCE exceeded its vapor intrusion criterion (2.9 µg/L) in 15 of 84 groundwater samples collected from 4 A-aquifer wells (IR04MW37A, IR04MW39A, IR12MW14A, and IR74MW01A), with concentrations ranging from 3.3 to 10.3 µg/L. TCE detections in samples collected from well IR04MW39A have not exceeded the vapor intrusion criteria since 1992. TCE was detected at a concentration of 3.7 µg/L in the June 2002 sample collected from well IR12MW14A, but was not detected in the subsequent four samples collected from this well from September 2002 through December 2004. The table on the following page summarizes the analytical results for TCE in samples collected from the remaining two wells, with the vapor intrusion criterion exceedances highlighted in bold.

Sampling Location	Sample Date	TCE (µg/L)	Qualifier
IR04MW37A	11-21-1991	5	
	02-14-1992	7.87	
	06-15-1992	5	U
	03-21-2001	6	
	07-18-2002	4	
	09-10-2002	3.8	
	06-15-2004	3.8	
	09-14-2004	4.9	
	12-01-2004	7	
IR74MW01A	07-12-1996	3	J
	09-04-1996	0.5	U
	11-15-1996	2	
	06-16-2004	3.7	
	09-14-2004	3.4	
	11-22-2004	3.3	

The 2004 TCE groundwater plumes in Redevelopment Block 45, shown on Figure 4-4, were defined by the extent of TCE based on the 2004 quarterly groundwater monitoring data (see Table 4-4). The 2004 analytical results indicated that the plumes are limited to areas around wells IR04MW37A and IR74MW01A.

Monitoring well IR04MW37A is about 50 feet east of Building 810 and 20 feet north of the railroad tracks at IR-04. The source of TCE in this area is likely the historical use of solvents along the railroad spur for cleaning metal parts.

Monitoring well IR74MW01A is located south of the IR-74 boundary in IR-56. The source of TCE at well IR74MW01 is unknown but may be related to former railroad yard activities (such as the use and storage of solvents for degreasing train parts) and to boxcars stored in this area. The enclosed boxcar observed near the northeast corner of Building 809 during the Fence-to-Fence Survey reportedly contained leaking solvent and paint containers (ERM-West 1988).

TCE in A-aquifer groundwater at Redevelopment Block 45 is discussed further in Section 4.3.7.4.2.

Semivolatile Organic Compounds

Samples collected from the A-aquifer wells associated with Redevelopment Block 45 were analyzed for SVOCs during one or more rounds of sampling; 10 SVOCs were detected. Of the 10 SVOCs detected, two (fluorene and phenanthrene) exceeded at least one of the appropriate screening criteria (vapor intrusion and surface water criteria). The spatial and temporal distributions of these two SVOCs are discussed below.

- Fluorene exceeded its surface water criteria (60 µg/L) in only 1 of 54 groundwater samples. The single exceedance (100 µg/L) was detected in a sample collected from well IR12MW21A in August 1992. Fluorene was not detected in the subsequent three samples collected from this well in September 1992, April 1996, and May 1996.
- Phenanthrene exceeded its surface water criteria (60 µg/L) in only 1 of 54 groundwater samples. The single exceedance (210 µg/L) was detected in a sample collected from well IR12MW21A in August 1992. Phenanthrene was not detected in the subsequent three samples collected from this well in September 1992, April 1996, and May 1996.

As a result, SVOCs in A-aquifer groundwater at Redevelopment Block 45 are not discussed further in this section.

Pesticides

Samples collected from the A-aquifer wells associated with Redevelopment Block 45 were analyzed for pesticides during one or more rounds of sampling; one pesticide (Endosulfan I) was detected (see Table 4.3.7-3). The one pesticide detection did not exceed the appropriate screening criteria (surface water criteria); therefore, pesticides are not discussed further in this section.

Polychlorinated Biphenyls

Samples collected from the A-aquifer wells associated with Redevelopment Block 45 were analyzed for PCBs during one or more rounds of sampling with only one detection (Aroclor-1260) in 47 samples. The single PCB detection (0.2 µg/L at well IR72MW32A) exceeded the surface water criterion (0.03 µg/L), which is less than the reported detection limits (ranging from 0.1 to 10 µg/L). This detection was qualified as estimated because the concentration was detected below the PQL. Aroclor-1260 was not detected in the two preceding samples collected from this well in November 1995 and March 1996, or in the only subsequent sample collected from this well in March 2001. As a result, PCBs in A-aquifer groundwater at Redevelopment Block 45 are not discussed further in this section.

Total Petroleum Hydrocarbons

Samples collected from the A-aquifer wells associated with Redevelopment Block 45 were analyzed for TPH products during one or more rounds of sampling. TPH-g, TPH-d, and TPH-mo were detected in groundwater samples collected from three, four, and five A-aquifer wells, respectively. The maximum concentrations detected of each TPH range varied from 5,900 to 390,000 µg/L (see Table 4.3.7-3). Only TPH-d was detected at a concentration exceeding the TPH screening criteria for groundwater. The spatial and temporal distribution of this TPH product is discussed below.

TPH-d exceeded the TPH screening criterion for groundwater (20,000 µg/L) in only one groundwater sample, collected from well IR12MW21A in September 1992 (390,000 µg/L). This sample also contained a TPH-g concentration of 10,000 µg/L, resulting in a TTPH concentration of 400,000 µg/L. TPH-d and TPH-g concentrations in subsequent samples collected from this well in April and May 1996 were all below 3,500 µg/L, with TTPH concentrations of 4,800 µg/L in April 1996 and 4,400 µg/L in May 1996. As a result, TPH products in A-aquifer groundwater at Redevelopment Block 45 are not discussed further in this section.

4.3.7.4.2 Extent of Chemicals in Groundwater

The screening process identified two 2004 groundwater plumes within Redevelopment Block 45 where concentrations of chemicals in A-aquifer groundwater consistently exceeded Parcel E screening criteria:

- Monitoring well IR04MW37A: TCE (see Figure 4-4 and Table 4-4)
- Monitoring well IR74MW01A: TCE (see Figure 4-4 and Table 4-4)

The source of TCE at well IR04MW37A is likely the past use of solvents along the railroad spur for cleaning metal parts. The source of TCE at well IR74MW01 is unknown but may be related to former railroad yard activities (such as the use and storage of solvents for degreasing train parts) and to boxcars stored in this area.

4.3.7.5 Contaminant Fate and Transport Evaluation

As described in Sections 4.3.7.3 and 4.3.7.4, five areas were identified where soil sampling results exceeded Parcel E soil screening criteria and two wells were identified where groundwater sampling results exceeded Parcel E groundwater screening criteria in Redevelopment Block 45. Chemicals identified in areas exceeding Parcel E screening criteria in soil are metals; SVOCs; PCBs; and TPH. Only one VOC (TCE) was identified in groundwater at concentrations exceeding Parcel E screening criteria based on the most recent sampling results in the RI data set. The persistence and mobility of these chemicals in soil and groundwater is discussed below.

Metals

The mobility of arsenic, copper, and lead is highly dependant on soil pH and infiltration of water. Soil pH within Redevelopment Block 45 ranges from 5.4 to 11.7 (see Appendix C). Average pH calculated as described in Section 4.3.2.5 is 7.1. Of 199 soil pH measurements, only nine were below 7.0. The predominantly above-neutral pH values measured in the vadose zone soil samples indicate that site conditions do not favor leaching of these metals into groundwater (see Appendix H). Although arsenic may be somewhat mobile in the basic soils, its concentrations in groundwater have not exceeded Parcel E screening criteria. Concentrations of copper and lead in groundwater also have not exceeded Parcel E screening criteria. Therefore,

the migration of arsenic, copper, and lead from the vadose zone soils to groundwater appears limited.

Volatile Organic Compounds

TCE was consistently detected at concentrations exceeding Parcel E screening criteria in samples from wells IR04MW37A and IR74MW01A.

TCE is highly soluble and has a relatively high vapor pressure. Thus, TCE is expected to volatilize or be carried along in the groundwater. However, site conditions at Redevelopment Block 45 appear to be favorable for degradation of TCE, as demonstrated by the presence of its degradation products (cis-1,2-DCE and trans-1,2-DCE) at well IR04MW37A. TCE degrades into cis-1,2-DCE through biodegradation, while TCE degrades into trans-1,2-DCE abiotically. As a result, migration of TCE from groundwater to the atmosphere is expected to be very limited at Redevelopment Block 45. The migration of TCE from groundwater to the Bay does not pose any risk because TCE concentrations are much lower than the surface water criteria.

Semivolatile Organic Compounds

SVOCs present in soils identified for further evaluation include benzo(a)pyrene and benzo(b)fluoranthene. Both of these chemicals are strongly sorbed to soils, have low solubilities in water, and low volatilization potential (see Appendix H). As a result, the potential for these chemicals to migrate from the vadose zone into groundwater is relatively low.

Polychlorinated Biphenyls

PCBs present in soils identified for further evaluation include Aroclor-1260. Aroclor-1260 was detected in surface (0 to 10 feet bgs) soil samples at concentrations exceeding Parcel E screening criteria at Redevelopment Block 45. Aroclor-1260 has very low solubility and low vapor pressure because of a high level of chlorination (see Appendix H). As a result, the potential for Aroclor-1260 to migrate from the vadose zone into groundwater is relatively low.

Total Petroleum Hydrocarbons

The detections of TPH that were noted for further evaluation in soil are associated with TPH-g, TPH-d, and TPH-mo range. Petroleum hydrocarbons are known to strongly sorb to soil and have low solubility in water. As a result, it is expected that the migration of petroleum hydrocarbons from soil to groundwater and the continued migration with groundwater would be limited.

4.3.8 Redevelopment Block EMI-1

This section summarizes the site characterization of Redevelopment Block EOS-1, including the site history (see Section 4.3.8.1), the geology and hydrogeology (see Section 4.3.8.2), the nature

and extent of chemicals in soil (see Section 4.3.8.3), the nature and extent of chemicals in groundwater (see Section 4.3.8.4), and the fate and transport of chemicals in soil and groundwater (see Section 4.3.8.5). The planned reuse for this redevelopment block is maritime/industrial. No tenants are currently present on this redevelopment block.

4.3.8.1 Site History

Redevelopment Block EMI-1 is located in the southern portion of Parcel E. This redevelopment block includes portions of seven IR sites: IR-02 Central, IR-02 Southeast, IR-11/14/15, IR-38, IR-40, IR-54, and IR-73. Site features within Redevelopment Block EMI-1 are shown on Figure 1-13. The subsections below discuss the historical uses of each IR site within the boundaries of Redevelopment Block EMI-1.

4.3.8.1.1 IR-02 Central

IR-02 Central covers approximately 18 acres along the southern shoreline of Parcel E. IR-02 Central extends into Redevelopment Blocks 44, EMI-1, EOS-1, EOS-2, and EOS-3. The northeast portion of IR-02 Central lies within Redevelopment Block EMI-1, and includes the northern portion of Triple A Site 17, the former oil reclamation ponds (see Figure 1-13). However, the actual ponds were located in EOS-2, and are discussed in more detail in Section 4.3.10.

4.3.8.1.2 IR-02 Southeast

The eastern portion of IR-02 Southeast is located in the southern portion of Redevelopment Block EMI-1. Most of IR-02 Southeast lies within Redevelopment Block EOS-3. IR-02 Southeast covers approximately 9 acres and consists of the Burn Disposal Area (see Figure 1-13).

The southeastern portion of IR-02 Southeast was formerly the site of a burn disposal area for domestic refuse. From 1945 to 1948, the Navy operated an open, 1-acre burn disposal area for domestic garbage and refuse-type wastes (NEESA 1984). Approximately 23,000 tons of domestic solid waste was estimated to have been disposed of and incinerated at IR-02 Southeast during this 3-year period. Although trash was burned daily, significantly reducing the volume of solid waste in the site, some solid waste may have been disposed of at IR-02 Southeast without burning (NEESA 1984). The burn disposal area was closed in 1948 because odor and smoke affected an adjacent Navy housing complex. Upon closure in 1948, the burn disposal area was graded and covered with fill (NEESA 1984).

4.3.8.1.3 IR-11/14/15

IR-11/14/15 is located in the central portion of Redevelopment Block EMI-1. IR-11/14/15 lies primarily within Redevelopment Block EMI-1, the remainder lies within Redevelopment Blocks 40 and 41. IR-11/14/15 covers approximately 8.2 acres and consists of the following site features within Redevelopment Block EMI-1 (see Figure 1-13):

- Buildings 506, 510, 510A, and 529
- Oily Waste Ponds (Triple A Site 13)
- Oily Liquid Waste Disposal Area (Triple A Sites 6 and 7)
- Incineration Tank
- Building 521 (Power Plant)

Buildings 506, 510, 510A, and 529

Buildings 506, 510, 510A, and 529 were occupied by NRDL in the early 1950s. Buildings 506, 510, and 510A were used as laboratories. Building 529 was used for radioisotope storage and housed a generator. The exact construction and demolition dates of these buildings are unknown. However, review of aerial photographs indicated that the buildings were likely constructed prior to 1950 and demolished sometime in the 1970s (PRC 1996c). With the exception of Building 529, operations in these buildings were moved to Building 815 or newer facilities in 1955; most areas in Buildings 506, 510, and 510A were decontaminated at that time.

Between December 1969 and January 1970, all of the former NRDL buildings were inspected and cleared by the AEC for unrestricted use (Tetra Tech, LFR, and U&A 1997). To confirm that residual radioactive materials associated with former NRDL operations were not present, a radiation survey of surface soil in the vicinity of the former NRDL buildings was performed during the Phase III radiation investigation. Residual radiological contamination was not detected at the ground surface during this survey; however, an anomaly was detected near Buildings 506 and 529. The New World Technology Phase V investigation found contaminated underground piping in this area. Remediation of the radiologically impacted areas was recommended in the Final Historical Radiological Assessment (RASO 2004) and will be addressed under the Navy's radiological program.

Oily Waste Ponds

Triple A Site 13 was identified in 1986 during the SFDA investigation of Triple A hazardous waste disposal practices. The oily waste ponds area (Triple A Site 13) is a fenced area northwest of Building 521. The area was originally used for military housing beginning sometime around 1946; the buildings were torn down in 1976 or 1977 (HLA 1993). Sometime between 1976 and 1986, Triple A allegedly used former Tank S-505 (located in IR-02 Southeast) to store waste oil

DHS 1988). A hose from the pumping manifold of former Tank S-505 in IR-02 Southeast was laid across "J" Street to discharge waste from the tank to two waste oil ponds in this area (SFDA 1986). Triple A allegedly discharged oily liquid wastes to the ground in this area, and the ground was visibly stained. In April 1986, ponds of oily wastewater were observed in this area (HLA 1989b, 1989c).

Oily Liquid Waste Disposal Area

The oily liquid waste disposal area, for the purposes of this RI Report, is in the northwestern half of IR-11/14/15. The oily liquid waste disposal area includes Triple A Sites 6 and 7. In 1946, this area consisted of housing, a movie theater, a dental clinic, a ship's dispensary, and the women officers' club (HLA 1993). Review of aerial photographs indicated that all buildings were torn down by 1970 (PRC 1996c). Triple A allegedly disposed of oily waste and salvage waste into a gully reportedly in an open area between Buildings 505 and 521 (SFDA 1986). The gully was reportedly filled with sandblast waste at a later date. The location of the gully is not apparent from existing surface conditions or from available aerial photographs (HLA 1990c). In addition, Triple A reportedly disposed of oil and other wastes mixed with water onto the ground; drums, transformers, and chemical canisters were also reportedly dumped at the site (Triple A Sites 6 and 7) (SFDA 1986). The oily wastes either were pumped by hose directly from former Tank S-505 in IR-02 Southeast or were pumped from a vacuum truck onto the ground (SFDA 1986). In 1988, no indications of surface disposal of hazardous wastes were apparent (HLA 1989b).

Incineration Tank

The incineration tank area is northeast of Building 521 (Triple A Site 12). In April 1986, a tank of unknown volume, two trashcans, and a dumpster were observed in the area northeast of Building 521 (Triple A Site 12) (HLA 1989c). The tank was apparently used as an incinerator, and staining was visible on the ground around the tank (SFDA 1986). The types of materials burned at this site are unknown (HLA 1994e). On April 4, 1986, trashcans and a dumpster were observed to contain copper plates, circuit boards, X-ray film, and miscellaneous trash (HLA 1989c). The tank was reportedly removed from the site in mid-July 1986, but staining was still visible on the ground (HLA 1989c). No indication of surface disposal was observed in 1988 (HLA 1989b). The dumpster and trashcans were later removed, and the time of removal is unknown (HLA 1990c).

Building 521 (Power Plant)

Building 521 is a 75- by 75- by 30-foot inactive structure in the south corner of IR-11/14/15. Construction began on Building 521 in 1948 and was completed in 1949. Building 521 has a concrete floor and contains large boilers and electrical switches, trenches for utility lines, several offices, and a locker room (HLA 1994b). From 1950 to 1969, Building 521 housed a high-pressure boiler power plant that burned fuel oil, used by the Navy to generate steam (NEESA 1984). The Navy used a fuel distribution line system (IR-47) to transport fuel from Berth 29 in Parcel D to Building 521 and former Tank S-505 (SFDA 1986). West of

Building 521 was a former water softening treatment plant and steam condenser used to prevent scaling in the steam line system (HLA 1988b).

Waste asbestos, battery acids, and chemical containers have been stored at Building 521 since the building was shut down from use as a power plant in 1969 (NEESA 1984). In 1984, an estimated 2 cubic yards of asbestos-containing insulation used to insulate the steam generation system was observed on the ground outside Building 521 (PRC 1990). In addition, 15 5-gallon chemical containers labeled as xylenes, metal conditioner, and paint were stored on a concrete pad southeast of the former power plant (NEESA 1984; EMCON 1987b).

The IAS recommended removal of waste asbestos and abandoned containers outside Building 521. Between April and September 1990, seven tanks with asbestos insulation from the water softening treatment area and associated piping were encapsulated and removed. In addition, asbestos insulation around the main water-softening tank and piping connecting the main water-softening tank to Building 521 were removed in 1990 (PRC 1990).

Triple A is suspected of having used the steam line system (IR-45) and fuel distribution line system (IR-47) to transport waste oil from Berth 29 in Parcel D to Building 521 and former Tank S-505 (SFDA 1986). Triple A was also suspected of using the steam line system and fuel distribution line to transport waste oil from former Tank S-505 to the former oil reclamation ponds (IR-03) (SFDA 1986).

An exploratory excavation (EE-18) was completed in early 1997 to remediate metals in soil in the area with a leaking drum northwest of Building 521. The area northwest of Building 521 had stained soil and concrete. The excavation consisted of removing approximately 56 cubic yards of soil to a depth of 6 feet bgs (Tetra Tech, LFR, and U&A 1997).

4.3.8.1.4 IR-38

A portion of IR-38 is located in the northeastern portion of Redevelopment Block EMI-1. Most of IR-38 lies within Redevelopment Blocks 40 and 41. The portion of IR-38 that lies within Redevelopment Block EMI-1 consists of the area east of Buildings 508 and 509. Building 508 was used by the NRDL as a biological laboratory, and Building 509 was used by the NRDL to perform irradiation activities. A complete description of IR-38 is provided in Section 4.3.4.1.2 as part of Redevelopment Block 41.

4.3.8.1.5 IR-40

IR-40 is located on Pier 2 in the southern portion of Redevelopment Block EMI-1 (see Figure 1-3). No soil exists at IR-40; therefore, no soil or groundwater samples were collected at IR-40. IR-40 lies entirely within Redevelopment Block EMI-1, and consists of the following site features:

- Building 527
- Pier 2

Building 527

Building 527, which is located approximately 640 feet out on Pier 2, was used by the Navy as an electrical substation. The floor, walls, and ceiling of this building are constructed entirely of reinforced concrete. The building is 17 feet by 24 feet in size and is 8 to 10 feet high. No floor drains or areas near the base of the walls are present where oil spills could migrate outside the building. In 1988, three electrical transformers were observed in Building 527 and one of the transformers was observed to be leaking PCB-laden oil from its drain valve to the floor (HLA 1990b). According to the Basewide Environmental Baseline Survey (EBS) in 1998, the transformers were subsequently removed from Building 527 and the EBS recommended no further action at Building 527 (Tetra Tech 1998b). It is not known if the concrete floor at Building 527 was sampled for PCBs following removal of the transformers. Building 527 is constructed entirely of reinforced concrete in sound condition, including ceiling, walls, and floor. The concrete floor of Building 527 should be tested for PCBs prior to demolition of the building and Pier 2.

Pier 2

Pier 2 is approximately 1,400 feet long and 60 feet wide and made of concrete. The concrete deck of the pier is approximately 1 foot thick. The integrity of both the concrete floor and primary concrete pillars of the pier appears to be fair. Rotting wood pillars, which are found along the entire perimeter of the pier, were most likely used as tie-ups when docking ships. These wood pillars apparently have no structural importance. The Bay lies below the entire length of the pier. Access to Pier 2 is limited because it has been fenced off. Evaluation of the pier indicated that it was structurally inadequate for reuse; therefore, it was condemned (Navy 1996). The pier will likely be demolished prior to reuse of HPS (Navy 1996).

4.3.8.1.6 IR-54

IR-54 is located in the east-central portion of Redevelopment Block EMI-1. IR-54 lies entirely within Redevelopment Block EMI-1. IR-54 covers approximately 0.1 acres and consists of Building 511A (see Figure 4.3.8-1). Building 511A was investigated as part of IR-54 because the building name suggests possible use or storage of hazardous substances in the past. Former Building 511A was used by the Navy as a woodworking hobby shop and was located outside the southeastern IR-11/14/15 extended site boundary. Review of aerial photographs indicated that Building 511A was demolished between 1969 and 1985 (PRC 1996c); it is likely that the demolition occurred subsequently to the de-establishment of the shipyard in 1974. Following demolition, miscellaneous debris was reportedly disposed of at the former building site (HLA 1994e). The site is currently vacant.

4.3.8.1.7 IR-73

IR-73 is located in the east-central portion of Redevelopment Block EMI-1. IR-73 lies entirely within Redevelopment Block EMI-1, is approximately 1.3 acres, and consists of the asphalt batch plant (see Figure 1-13). From 1986 to 1989, San Francisco Asphalt leased the IR-73 land area from the Navy for use as an asphalt manufacturing site. To support asphalt manufacturing operations, four ASTs were located at IR-73 (HLA 1994b). Two 1,000-gallon ASTs stored diesel fuel in the eastern portion of IR-73 (HLA 1994b). These ASTs were surrounded by a 3-foot high asphalt berm; the asphalt pavement within the bermed area is in poor condition but shows no evidence of spills. One 500-gallon AST stored diesel fuel in the southwestern portion of IR-73 (HLA 1994b). One 4,000-gallon AST stored asphalt stock south of the bermed area (HLA 1994b). These four ASTs were removed from IR-73 by January 1994; however, the asphalt berm is still present on the site.

Two heavily stained and damaged asphalt areas were observed at IR-73 during the SA; drums of oily liquid were formerly stored in these areas during asphalt manufacturing operations (HLA 1994b). The first stained and damaged area is north of the asphalt berm and is 6 feet by 6 feet in size. The second area is west of the asphalt berm and is 4 feet by 10 feet in size. Drums of oily liquid stored in these areas were removed by the Public Works Center in 1992 as part of routine facility maintenance.

4.3.8.2 Geology and Hydrogeology

This section briefly discusses the main geological and hydrogeological features that exist beneath Redevelopment Block EMI-1. A full description of geology and hydrogeology at Parcel E is presented in Sections 3.4 and 3.5, respectively.

Most of Block EMI-1 is covered in ruderal vegetation. The southeast corner (approximately 30 percent of the redevelopment block) is primarily bare dirt. From the surface downward, the geologic units at IR-11/14/15 consist of Artificial Fill, Undifferentiated Upper Sand Deposits, Bay Mud Deposits, Undifferentiated Sedimentary Deposits, and Franciscan Complex bedrock. The Artificial Fill overlies native sediments at all locations in Block EMI-1 except where bedrock is close to the ground surface at Shag Rock. In this area, Artificial Fill directly overlies bedrock.

The Artificial Fill at Redevelopment Block EMI-1, which ranges from approximately 2 to 26 feet thick, consists predominantly of sand and gravel mixtures with varying proportions of clay and silt. In several instances, serpentinite boulder fill was also encountered in this lithologic unit. The Undifferentiated Upper Sand Deposits, which range from approximately 0 to 18 feet thick, consist predominantly of poorly graded sand with up to 60 percent shell fragments and occasional clay or silt. This stratigraphic unit appears to occur intermittently throughout Redevelopment Block EMI-1, and is predominantly absent in the center portion of the site, near a bedrock high (Shag Rock). The Bay Mud Deposits, which range from approximately 0 to 23 feet thick beneath the site, consist predominantly of clay, with trace amounts up to 30 percent shell fragments and occasional silt or fine-grained sand. This lithologic unit appears to be

laterally discontinuous beneath Redevelopment Block EMI-1, predominantly in the central portion of the site near "Shag Rock," where the Artificial Fill directly overlies the bedrock. The Undifferentiated Sedimentary Deposits encountered have noncontinuous thicknesses of approximately 6 and 45 feet in this redevelopment block. Where encountered, the Undifferentiated Sedimentary Deposits consist of silty sand with clay and sand with clay and gravel. In the central portion of the redevelopment block, this lithologic unit is absent near Shag Rock. Franciscan Complex bedrock consists predominantly of intensely weathered and fractured serpentinite. The bedrock surface slopes radially away from the bedrock high, and the surface throughout Redevelopment Block EMI-1 is estimated to occur at depths ranging from approximately 5 to 100 feet below msl (see Figure 3-8).

The hydrostratigraphy beneath Redevelopment Block EMI-1 consists of an A-aquifer, an aquitard, and a B-aquifer. Shallow weathered bedrock in direct contact with Artificial Fill is considered part of the A-aquifer. Based on average groundwater elevations measured in the A-aquifer wells, the depth to groundwater in the A-aquifer ranges from 5.9 to 12.9 feet bgs throughout this redevelopment block. Groundwater flow in the A-aquifer at Redevelopment Block EMI-1 is generally to the south in the area south of the bedrock high (Shag Rock) and north and northwest in the area north of the bedrock high. The B-aquifer is absent where bedrock is high (at Shag Rock). It is separated from the A-aquifer by the Bay Mud aquitard elsewhere (see cross section I-I' on Figure 3-6). Beneath Redevelopment Block EMI-1, the A- and B-aquifers are not in direct hydraulic communication. The general direction of groundwater flow for the B-aquifer is approximately southeast (see Figures 3-12 and 3-13).

4.3.8.3 *Nature and Extent of Chemicals in Soil*

This section summarizes the evaluation of the nature and extent of chemicals in soil within the boundary of Redevelopment Block EMI-1. The evaluation follows the approach for identifying chemicals and their spatial extent described in Section 4.1.

4.3.8.3.1 *Identification and Spatial Distribution of Chemicals in Soil*

This section summarizes the chemicals identified in soil at Redevelopment Block EMI-1. Approximately 549 samples were collected at Redevelopment Block EMI-1. Figure 4.3.8-1 shows the locations where soil samples were collected from Redevelopment Block EMI-1. Soil samples were analyzed for metals (including hexavalent chromium), VOCs, SVOCs (including PAHs), cyanide, pesticides, PCBs, TPH, dioxins, and radioactive materials. Cyanide was not detected at concentrations above the reporting limits in any of the soil samples; therefore, it is not discussed further in this section. Radiological data are being addressed as part of the radiological program for HPS; therefore, these data are not discussed further in this Revised Parcel E RI Report.

Tables 4.3.8-1 and 4.3.8-2 present the summary statistics for chemicals that were detected at concentrations exceeding the residential and industrial soil screening criteria. Table 4.3.8-1 presents the statistics for 454 surface (0 to 10 feet bgs) soil samples. Table 4.3.8-2 presents the statistics for 89 subsurface (deeper than 10 feet bgs) soil samples. Appendix C includes the

complete soil data set used to generate the summary statistics tables for this redevelopment block.

The chemicals detected in soil are described below by analytical group: metals, VOCs, SVOCs, pesticides, PCBs, TPH, and dioxins/furans.

Metals

The risk due to metals is primarily in the upper 10 feet of soil (see Appendix I); therefore, this discussion focuses on the data for metals in surface soil samples. Twenty-four metals were detected in soil samples collected from the surface to a depth of 10 feet bgs. Of the 24 metals detected, 13 metals were detected at concentrations exceeding residential soil screening criteria; only two metals were detected at concentrations that exceeded industrial soil screening criteria.

The lateral extent of elevated concentrations of metals was evaluated to identify areas within Redevelopment Block EMI-1 where these metals exceeded Parcel E industrial screening criteria in soil. Figure 4.3.8-2 shows the sampling locations where concentrations of these metals exceeded Parcel E industrial screening criteria and presents the elevated concentrations at each location. Concentrations of the metals exceeded the screening criteria in soil at contiguous sampling locations at the following three locations:

- Northwest of Building 521 (arsenic and lead)
- East of former Building 510 (arsenic)
- West of former Building 514 (arsenic and lead)

Isolated locations with elevated concentrations of arsenic or lead are also shown on Figure 4.3.8-2; none of the results for isolated locations are indicative of a source area.

The area northwest of Building 521 coincides with an area of stained soil and concrete. An exploratory excavation (EE-18) was completed in early 1997 to remediate metals in soil in the area where a leaking drum was identified northwest of Building 521. The excavation consisted of removing approximately 56 cubic yards of soil to a depth of 6 feet bgs. Activities related to the storage area may have resulted in releases of metals to soil. The area east of former Building 510 is associated with the NRDL's use of the building. Activities at these buildings may have resulted in the release of metals to soil. The random and undocumented use of sandblast waste as fill material between Buildings 505 and 521 may be an additional source of metals contamination in the area.

Volatile Organic Compounds

Thirty-three VOCs were detected in soil samples collected from the surface to 10 feet bgs, and 12 VOCs were detected in soil samples collected from greater than 10 feet bgs. None of these VOCs were detected at concentrations exceeding the Parcel E residential or industrial screening criteria. As a result, the nature and extent of VOCs in soil at Redevelopment Block EMI-1 is not discussed further in this section.

Semivolatile Organic Compounds

Thirty-five SVOCs were detected in one or more soil samples collected from surface soil (0 to 10 feet bgs). Of the 35 SVOCs detected, 9 SVOCs were detected at concentrations exceeding Parcel E residential screening criteria, and 6 SVOCs exceeded the Parcel E industrial screening criteria (see Table 4.3.8-1). Eighteen SVOCs were detected in soil samples collected from greater than 10 feet bgs. Of the 18 SVOCs detected, 6 SVOCs were detected at concentrations exceeding residential screening criteria, and 2 SVOCs exceeded the industrial screening criteria.

The lateral extent of elevated concentrations of SVOCs was evaluated to identify areas within Redevelopment Block EMI-1 where SVOCs exceeded Parcel E industrial screening criteria in soil. Figure 4.3.8-3 shows the sampling locations where concentrations of SVOCs exceeded Parcel E industrial screening criteria and presents the elevated concentrations at each location. Concentrations of SVOCs exceeded the screening criteria in soil at contiguous sampling locations northeast of Building 521 and in the northern corner of IR-73. Concentrations at several isolated locations also exceeded the screening criteria; none of the isolated locations of SVOCs are indicative of a source area.

The area northeast of Building 521 is associated with the incineration tank area (Triple A Site 12). Activities at this site may have resulted in a release of SVOCs to soil. The area in the northern corner of IR-73 is associated with the asphalt batch plant and ASTs formerly located in this area. These activities may have resulted in releases of SVOCs.

Pesticides

Twenty-six pesticides were detected in soil samples collected from surface soil (0 to 10 feet bgs). Of the 26 pesticides detected, 5 pesticides were detected at concentrations exceeding the Parcel E residential screening criteria; no pesticides were detected in concentrations that exceeded industrial screening criteria (see Table 4.3.8-1 and Figure 4.3.8-4). No pesticides were detected in soil samples collected deeper than 10 feet bgs. As a result, the nature and extent of pesticides in soil at Redevelopment Block EMI-1 is not discussed further in this section.

Polychlorinated Biphenyls

Nineteen PCBs were detected in soil samples collected from surface soil (0 to 10 feet bgs) (see Table 4.3.8-1). Two PCBs were detected at concentrations exceeding Parcel E residential and industrial screening criteria (see Table 4.3.8-1). No PCBs were detected in soil deeper than 10 feet bgs (see Table 4.3.8-2).

The lateral extent of elevated concentrations of PCBs was evaluated to identify areas within Redevelopment Block EMI-1 where PCBs exceeded Parcel E industrial screening criteria in soil. Figure 4.3.8-4 shows the sampling locations where concentrations of PCBs exceeded Parcel E industrial screening criteria. Figure 4.3.8-4 presents the elevated concentrations at each location. Concentrations of PCBs exceeded the screening criteria in soil at isolated sampling locations southeast of Building 506 and west of Building 521. Concentrations at isolated locations also exceeded the screening criteria, though none are indicative of a source area, but may be related to the random and undocumented use of ABM as fill material.

The area southeast of former Building 506 is associated with the NRDL's use of the building. Activities at these buildings may have resulted in the release of PCBs to soil. The area west and northwest of Building 521 coincides with an area of stained soil and concrete. Activities related to this storage area may have resulted in releases of PCBs to soil.

Total Petroleum Hydrocarbons

TPH concentrations exceeded the soil source screening criterion in 13 locations. Several of the sample locations were collocated with CERCLA chemicals. No free product was detected in monitoring wells within this redevelopment block (Tetra Tech 2002c).

The lateral extent of elevated concentrations of TTPH was evaluated to identify areas within Redevelopment Block EMI-1 where TTPH exceeded the soil source screening criterion in soil. Figure 4.3.8-4 shows the sampling locations where concentrations of TTPH exceeded the soil source screening criterion and presents the elevated concentrations at each location. Concentrations of TTPH exceeded the screening criteria in soil at contiguous sampling locations southwest of former Building 518 and in the northern corner of IR-73.

The area southwest of former Building 518 is associated with CAA7 under the TPH program. The area in the northern corner of IR-73 is outside of CAA11 and is collocated with benzo(a)pyrene. Concentrations at isolated locations also exceeded the screening criteria; none of the isolated locations of TTPH are indicative of a source area.

Dioxins and Furans

Twenty-two dioxin and furans were detected in soil samples collected from surface soil (0 to 10 feet bgs) (see Table 4.3.8-1). Two dioxins and furans were detected at concentrations exceeding Parcel E residential screening criteria, though none were detected at concentrations

that exceeded industrial screening criteria (see Table 4.3.8-1). Neither of the dioxins and furans exceeded the residential screening criteria by more than one order of magnitude. No dioxins and furans were detected in soil deeper than 10 feet bgs (see Table 4.3.8-2). As a result, the nature and extent of dioxins and furans in soil at Redevelopment Block EMI-1 is not discussed further in this section.

4.3.8.3.2 Extent of Chemicals in Soil

The screening process identified eight areas within Redevelopment Block EMI-1 where concentrations of chemicals in soil at contiguous sampling locations exceeded Parcel E screening criteria:

- Northwest of Building 521: metals and PCBs (see Figures 4.3.8-2 and 4.3.8-4)
- Northeast of Building 521: SVOCs (see Figure 4.3.8-3)
- West of Building 521: PCBs (see Figure 4.3.8-4)
- Southeast of former Building 506: PCBs (see Figure 4.3.8-4)
- East of former Building 510: metals (see Figure 4.3.8-2)
- West of former Building 514: metals (see Figure 4.3.8-2)
- Northern corner of IR-73: SVOCs and TTPH (see Figures 4.3.8-3 and 4.3.8-4)
- Southwest of former Building 518: TTPH (see Figure 4.3.8-4)

The area northwest of Building 521 coincides with an area of stained soil and concrete. An exploratory excavation (EE-18) was completed in early 1997 to remediate metals in soil in the area where a leaking drum was identified northwest of Building 521. The excavation consisted of removing approximately 56 cubic yards of soil to a depth of 6 feet bgs. Activities related to the storage area may have resulted in releases of metals to soil. The random and undocumented use of sandblast waste as fill material between Buildings 505 and 521 may be an additional source of metals contamination in the area. The estimated size of the area is 75 feet (east-west) by 100 feet (north-south). The depth to groundwater is 7.7 feet bgs.

The area northeast of Building 521 is associated with the incineration tank area (Triple A Site 12). Activities at this site may have resulted in a release of SVOCs to soil. It is assumed that Building 521 bounds the area to the southwest. The estimated size of the area is 150 feet (east-west) by 200 feet (north-south). The depth to groundwater is 7.7 feet bgs.

The area southeast of former Building 506 is associated with the NRDL's use of the building. Activities at these buildings may have resulted in the release of PCBs to soil. The estimated size of the area is 150 feet (east-west) by 100 feet (north-south). The depth to groundwater is 7.7 feet bgs.

The area east of former Building 510 is associated with the NRDL's use of the building. Activities at these buildings may have resulted in the release of metals to soil. The estimated size of the area is 50 feet (east-west) by 75 feet (north-south). The depth to groundwater is 9.8 feet bgs.

Activities at the area west of former Building 514 may have resulted in releases of metals to soil. The estimated size of the area is 100 feet (east-west) by 100 feet (north-south). The depth to groundwater is approximately 8 feet bgs.

The area in the northern corner of IR-73 is associated with the asphalt batch plant and ASTs formerly located in this area. These activities may have resulted in releases of SVOCs and TPH. The estimated size of the area is 150 feet (east-west) by 175 feet (north-south). The depth to groundwater is 12.9 feet bgs.

Former activities in the area southwest of former Building 518 are unknown. The random and undocumented use of sandblast waste as fill material between Buildings 505 and 521 may be an additional source of metals contamination in the area. The estimated size of the area is 250 feet (east-west) and 200 feet (north-south). The depth to groundwater is 7.7 feet bgs.

4.3.8.4 *Nature and Extent of Chemicals in Groundwater*

This section summarizes the evaluation of the nature and extent of chemicals detected in groundwater samples collected from monitoring wells associated with Redevelopment Block EMI-1. Figure 4.3.8-5 shows the locations of the groundwater monitoring wells associated with Redevelopment Block EMI-1 where groundwater samples were collected for this evaluation.

Tables 4.3.8-3 and 4.3.8-4 present the summary statistics for chemicals that were detected in the A-aquifer and the bedrock water-bearing zone, respectively. No B-aquifer wells are associated with Redevelopment Block EMI-1. Table 4.3.8-3 presents statistics for data from 16 A-aquifer wells; Table 4.3.8-4 presents statistics for data from two bedrock water-bearing zone wells. Chemicals that were retained for evaluation based on consideration of the factors described in Section 4.1.2.2 are shaded and shown in bold font in these tables. Appendix D includes the complete groundwater data set for this redevelopment block.

4.3.8.4.1 Chemicals in A-Aquifer Groundwater

Sixteen A-aquifer wells are associated with Redevelopment Block EMI-1 (see Figure 4.3.8-5), including 1 well located just outside the northern boundary of the redevelopment block. Groundwater samples collected from the A-aquifer wells were analyzed for metals (including hexavalent chromium), VOCs, SVOCs, cyanide, PCBs, pesticides, TPH, and tributyltin. PCBs and tributyltin were not detected in groundwater samples collected from A-aquifer wells; therefore, these chemicals are not discussed further in this section.

The chemicals that were detected in groundwater samples collected from the A-aquifer are evaluated below by analytical group: metals, VOCs, SVOCs, cyanide, pesticides, and TPH.

Metals

Samples collected from the A-aquifer wells associated with Redevelopment Block EMI-1 were analyzed for metals during one or more rounds of sampling; 24 metals were detected. Of the 24 metals detected, 7 metals (arsenic, cadmium, copper, lead, mercury, nickel, and silver) exceeded the appropriate screening criterion (surface water criteria, or HGALs if greater than surface water criteria). The spatial and temporal distributions of these seven metals in groundwater are discussed below.

- Arsenic exceeded its surface water criterion (36 µg/L) and its HGAL (27.34 µg/L) in only three groundwater samples, collected from PA50MW05A in 1993, 1995, and 1996. This well is located approximately 200 feet from the Bay. Arsenic detections in samples collected at well PA50MW05A from 1993 to 2001 have ranged from 26.7 to 42.7 µg/L. Arsenic was detected at a concentration of 28.6 µg/L in the most recent sample collected from this well in the RI data set (February 2001).
- Cadmium exceeded its surface water criterion (8.8 µg/L) and its HGAL (5.08 µg/L) in only one groundwater sample, collected from IR14MW12A in November 1991, with a concentration of 14.1 µg/L. This well is located approximately 700 feet from the Bay. Cadmium was detected at concentrations below 3 µg/L in the four subsequent samples collected from this well in 1992, 2001, and 2002.
- Copper exceeded its surface water criterion (3.1 µg/L) and its HGAL (28.04 µg/L) in only one groundwater sample, collected from IR11MW27A in March 1989, with an estimated concentration of 98 µg/L. This well is located approximately 300 feet from the Bay. Copper was not detected above 8 µg/L in three subsequent samples collected from this well in March 2001, July 2002, and September 2002.
- Lead exceeded its surface water criterion (5.6 µg/L) and its HGAL (14.44 µg/L) in 3 of 62 samples. The three exceedances were detected in samples collected from wells IR15MW06A and IR15MW07A in February 1992 (127 and 35.5 µg/L, respectively), and well PA50MW05A in October 1993 (38.1 µg/L in the original sample and 42 µg/L in the duplicate). Wells IR15MW06A, IR15MW07A, and PA50MW05A are located approximately 300, 700, and 200 feet from the Bay, respectively. The lead detections at wells IR15MW06A and IR15MW07A were estimated quantities below the PQL, and lead was only detected (at a concentration of 0.195 µg/L) in one of the three subsequent samples collected from each of these wells in 2001 and 2002. Lead was not detected in the subsequent three samples collected from well PA50MW05A in 1995 and 1996.
- Mercury exceeded its surface water criterion (0.025 µg/L) and its HGAL (0.6 µg/L) in only one groundwater sample. The exceedance was detected in a sample collected from well IR14MW09A in February 1992 (0.91 µg/L in the original sample and 0.46 µg/L in the duplicate). Well IR14MW09A is located approximately 400 feet from the Bay. Mercury was not detected in the subsequent four samples collected from well IR14MW09A in September 1992 and March, July, and September 2002.

- Nickel exceeded its surface water criterion (8.2 µg/L) and its HGAL (96.48 µg/L) in only two groundwater samples. The two exceedances were detected in samples collected from wells IR14MW09A (125 µg/L in the original sample and 130 µg/L in the duplicate) and IR14MW12A (102 µg/L), both in November 1991. Well IR14MW09A is located approximately 400 feet from the Bay, and well IR14MW12A is located approximately 800 feet from the Bay. Nickel was not detected above 87.5 µg/L in the subsequent five samples collected from well IR14MW09A (from February 1992 through September 2002) and was detected or estimated below 30 µg/L in the last two samples collected from this well in July and September 2002. Nickel has only been detected once in the five subsequent samples collected from well IR14MW12A (from February 1992 through September 2002), at an estimated concentration of 2.3 µg/L.
- Silver exceeded its surface water criterion (0.38 µg/L) and its HGAL (7.43 µg/L) in only one groundwater sample, collected from IR15MW07A in November 1991, with a concentration of 7.5 µg/L. This well is located approximately 700 feet from the Bay. The single exceedance was qualified as estimated, and silver was detected at a concentration of 6.3 µg/L in the duplicate sample. Silver has been detected only once in the five subsequent samples collected from well IR15MW07A (from February 1992 through September 2002), at a concentration of 0.14 µg/L.

Metals detected in A-aquifer groundwater at Redevelopment Block EMI-1 are not discussed further in this section.

Volatile Organic Compounds

Samples collected from the A-aquifer wells associated with Redevelopment Block EMI-1 were analyzed for VOCs during one or more rounds of sampling; 12 VOCs were detected. Of the 12 VOCs detected, 5 VOCs (1,1-DCA, benzene, carbon tetrachloride, chloroform, and PCE) exceeded at least one of the appropriate screening criteria (vapor intrusion and surface water criteria). The spatial and temporal distributions of these five VOCs are discussed below.

- 1,1-DCA exceeded its vapor intrusion criterion (6.5 µg/L) in 1 of 73 groundwater samples. The single exceedance (8.71 µg/L) was detected in a sample collected from well IR15MW06A in September 1992; however, 1,1-DCA was not detected in the duplicate sample at a reporting limit of 5 µg/L. 1,1-DCA detections in the subsequent six samples collected from this well (from March 2001 through December 2004) have not exceeded 1.2 µg/L.
- Benzene exceeded its vapor intrusion criterion (0.37 µg/L) in 1 of 73 groundwater samples. The single exceedance (1 µg/L) was detected in a sample collected from well IR14MW13A in August 1992. Benzene was detected at an estimated concentration of 0.3 µg/L in the two subsequent samples collected from this well in April and May 1996, and was not detected in the most recent sample collected from this well in the RI data set (April 2002).

- Carbon tetrachloride exceeded its vapor intrusion criterion (0.046 µg/L) in 1 of 73 groundwater samples. The single exceedance (2 µg/L) was detected in a sample collected from well IR11MW25A in November 1991, and was qualified as estimated because the concentration was below the PQL. Carbon tetrachloride was not detected in the two subsequent samples collected from this well in September 1992 and March 2001.
- Chloroform exceeded its vapor intrusion criterion (0.7 µg/L) in 2 of 73 groundwater samples. The two exceedances were detected in samples collected from well IR02MW196A in March 1991 (2.3 µg/L) and from well IR14MW12A in February 1992 (2 µg/L). Both chloroform detections were estimated quantities (below the PQL). Chloroform was not detected in the two subsequent samples collected from well IR02MW196A in January and August 1992, and was not detected in the one subsequent sample collected from well IR14MW12A in September 1992.
- PCE exceeded its vapor intrusion criterion (0.54 µg/L) in 3 of 73 groundwater samples. The three exceedances were detected in samples collected from wells IR11MW25A, IR11MW26A, and IR11MW27A in November 1991, with concentrations ranging from 9 to 38 µg/L. PCE was not detected in the subsequent two samples collected from IR11MW25A (in September 1992 and March 2001), the subsequent four samples collected from well IR11MW26A (from September 1992 through September 2002), or the subsequent six samples collected from well IR11MW27A (from September 1992 through September 2004).

VOCs detected in A-aquifer groundwater at Redevelopment Block EMI-1 are not discussed further in this section.

Semivolatile Organic Compounds

Samples collected from the A-aquifer wells associated with Redevelopment Block EMI-1 were analyzed for SVOCs during one or more rounds of sampling; 16 SVOCs were detected. Of the 16 SVOCs detected, only one (pentachlorophenol) exceeded at least one of the appropriate screening criteria (vapor intrusion and surface water criteria). Pentachlorophenol was detected above the surface water criterion (7.9 µg/L) in one sample collected from well IR02MW183A in January 1992, with an estimated concentration of 33 µg/L. Pentachlorophenol was not detected in the subsequent five samples collected from this well (from June 1992 through September 2002). As a result, SVOCs in A-aquifer groundwater at Redevelopment Block EMI-1 are not discussed further in this section.

Cyanide

Samples collected from the A-aquifer wells associated with Redevelopment Block EMI-1 were analyzed for cyanide during one or more rounds of sampling, with only one detection in seven samples (see Table 4.3.8-3). The single detection of cyanide (0.98 µg/L at well PA50MW08A in

March 1996) did not exceed the surface water criterion. As a result, cyanide in A-aquifer groundwater at Redevelopment Block EMI-1 is not discussed further in this section.

Pesticides

Samples collected from the A-aquifer wells associated with Redevelopment Block EMI-1 were analyzed for pesticides during one or more rounds of sampling; two pesticides were detected (see Table 4.3.8-3). Of the two pesticides detected, only one pesticide (gamma-chlordane) exhibited concentrations exceeding surface water criteria. The exceedance (0.005 µg/L) occurred in a sample collected from well IR11MW25A in March 2001. Gamma-chlordane was not detected in the previous three samples collected from this well in 1989, 1990, and 1991, and was not analyzed for subsequent to March 2001. Based on limited data and few exceedances, pesticides in A-aquifer groundwater at Redevelopment Block EMI-1 are not discussed further in this section.

Total Petroleum Hydrocarbons

Samples collected from the A-aquifer wells associated with Redevelopment Block EMI-1 were analyzed for TPH products during one or more rounds of sampling. TPH-d, TPH-g, and TPH-mo were detected in groundwater samples collected from 3, 9, and 10 A-aquifer wells, respectively. The maximum concentrations detected of each TPH range varied from 3,500 to 280,000 µg/L (see Table 4.3.8-3). The maximum concentrations were all less than the TPH screening criteria for groundwater (as shown in Table 4-1), except for two exceedances. The two exceedances were detected in samples collected in September 1992 from IR14MW13A, which contained a TPH-d concentration of 280,000 µg/L and a TPH-g concentration of 210,000 µg/L, and IR15MW08A, which contained a TPH-d concentration of 65,000 µg/L. TTPH concentrations in the four subsequent samples collected from each of these wells did not exceed the screening criterion (20,000 µg/L). The most recent samples in the RI data set collected from wells IR14MW13A and IR15MW08A (April 2002) exhibited TTPH concentrations of 2,430 µg/L and less than 400 µg/L, respectively. As a result, TPH products in A-aquifer groundwater at Redevelopment Block EMI-1 are not discussed further in this section.

4.3.8.4.2 Chemicals in the Bedrock Water-Bearing Zone

Two bedrock water-bearing zone wells are located within Redevelopment Block EMI-1 (see Figure 4.3.8-5). Groundwater samples collected from the bedrock water-bearing zone wells were analyzed for metals (including hexavalent chromium), VOCs, SVOCs, pesticides, and TPH. Pesticides were not detected in any groundwater samples collected from the bedrock water-bearing zone wells associated with Redevelopment Block EMI-1; therefore, these chemicals are not discussed further in this section. Table 4.3.8-4 presents the summary statistics for chemicals detected in samples collected from the bedrock water-bearing zone wells.

The chemicals that were detected in groundwater samples collected from the bedrock water-bearing zone are evaluated below by the following analytical groups: metals, VOCs, SVOCs, and TPH.

Metals

Samples collected from the bedrock water-bearing zone wells associated with Redevelopment Block EMI-1 were analyzed for metals during one or more rounds of sampling; 15 metals were detected. Of the 15 metals detected, 1 metal (arsenic) exceeded the appropriate screening criterion (surface water criteria, or HGALs if greater than surface water criteria). Arsenic exceeded its surface water criterion (36 µg/L) and its HGAL (27.34 µg/L) in only one of nine groundwater sample. The single exceedance was in a sample collected from IR15MW10F in September 1992 and was qualified as estimated because it was below the PQL. This well is located approximately 360 feet from the Bay. Arsenic was not detected above 11 µg/L in the four subsequent samples collected from this well in 1996, 2001, and 2002. As a result, metals in bedrock water-bearing zone groundwater at Redevelopment Block EMI-1 are not discussed further in this section.

Volatile Organic Compounds

Samples collected from the bedrock water-bearing zone wells in Redevelopment Block EMI-1 were analyzed for VOCs during one or more rounds of sampling; six VOCs were detected. Of the six VOCs detected, none exceeded any of the appropriate screening criteria listed in Table 4.3.8-4. As a result, VOCs in bedrock water-bearing zone groundwater at Redevelopment Block EMI-1 are not discussed further in this section.

Semivolatile Organic Compounds

Samples collected from the bedrock water-bearing zone wells in Redevelopment Block EMI-1 were analyzed for SVOCs during one or more rounds of sampling; one SVOC [bis(2-ethylhexyl)phthalate] was detected in one sample. An appropriate screening criteria has not been identified for bis(2-ethylhexyl)phthalate, as indicated in Table 4.3.8-4. As a result, SVOCs in bedrock water-bearing zone groundwater at Redevelopment Block EMI-1 are not discussed further in this section.

Total Petroleum Hydrocarbons

Samples collected from the bedrock water-bearing zone wells associated with Redevelopment Block EMI-1 were analyzed for TPH products during one or more rounds of sampling. TPH-d, TPH-mo, and TPH-e were detected in groundwater samples collected from one, one, and two bedrock water-bearing zone wells, respectively. The maximum concentrations detected of each TPH range varied from 75 to 600 µg/L (see Table 4.3.8-4). The maximum concentrations were all less than the TPH screening criteria for groundwater (as shown in Table 4-1). As a result, TPH products in bedrock water-bearing zone groundwater at Redevelopment Block EMI-1 are not discussed further in this section.

4.3.8.4.3 Extent of Chemicals in Groundwater

The screening process identified no chemicals within Redevelopment Block EMI-1 where concentrations of chemicals in A-aquifer groundwater consistently exceeded Parcel E screening criteria.

The screening process identified no chemicals within Redevelopment Block EMI-1 where concentrations of chemicals in bedrock water-bearing zone groundwater consistently exceeded Parcel E screening criteria.

4.3.8.5 Evaluation of Chemical Fate and Transport

As described in Sections 4.3.8.3 and 4.3.8.4, eight areas were identified where soil sampling results exceeded Parcel E soil screening criteria in Redevelopment Block EMI-1. Chemicals identified in areas exceeding Parcel E screening criteria in soil are metals (arsenic and lead); SVOCs; PCBs; and TPH. The persistence and mobility of these chemicals in soil is discussed below. No chemicals were identified in groundwater that consistently exceeded the Parcel E screening criteria.

Metals

The mobility of arsenic and lead is highly dependant on soil pH and infiltration of water. Soil pH within Redevelopment Block EMI-1 ranges from 6.2 to 10 (see Appendix C). Average pH calculated as described in Section 4.3.2.5 is 7.8. Of 215 soil pH measurements, only five were below 7.0. The predominantly above-neutral pH values measured in the vadose zone soil samples indicate that site conditions do not favor leaching of these metals into groundwater (see Appendix H). Although arsenic may be somewhat mobile in the basic soils, its concentrations in groundwater have not exceeded Parcel E screening criteria. Concentrations of lead in groundwater also have not exceeded Parcel E screening criteria. Therefore, the migration of arsenic and lead from the vadose zone soils to groundwater appears limited.

Mercury is not expected to be highly mobile in soil environments and is typically found to be sorbed to soil organic and inorganic materials. Based on an average TOC content of 1.9 percent in soil from 0 to 10 feet bgs at Redevelopment Block EMI-1, mercury is not expected to be mobile in soil at Redevelopment Block EMI-1 because of its tendency to be sorbed to soil organic and inorganic material. As a result, it is expected that the further migration of mercury from soil to groundwater and the continued migration with groundwater toward the Bay would be limited.

Semivolatile Organic Compounds

SVOCs in soil identified for further evaluation include benzo(a)pyrene, and benzo(b)fluoranthene. Based on an average TOC content of 1.9 percent in soil from 0 to 10 feet bgs at Redevelopment Block EMI-1, the mobility of these SVOCs in soil is expected to be

limited because these chemicals are (1) strongly sorbed to soils, (2) have low solubilities in water, and (3) low volatilization potential (see Appendix H). As a result, the potential for these chemicals to migrate from soil into groundwater is relatively low.

Polychlorinated Biphenyls

PCBs present in soils identified for further evaluation include Aroclor-1254 and Aroclor-1260. Aroclor-1254 and Aroclor-1260 have very low solubility and low vapor pressure because of a high level of chlorination (see Appendix H). Based on an average TOC content of 1.9 percent in soil from 0 to 10 feet bgs at Redevelopment Block EMI-1, the mobility of PCBs in soil is expected to be limited because PCBs tend to strongly sorb to organic carbon in soil. As a result, the potential for Aroclor-1254 and Aroclor-1260 to migrate from the vadose zone into groundwater is relatively low.

Total Petroleum Hydrocarbons

The detections of TPH that were noted for further evaluation in soil are associated with TPH-g, TPH-d, and TPH-mo range. Based on an average TOC content of 1.9 percent in soil from 0 to 10 feet bgs at Redevelopment Block EMI-1, the mobility of petroleum hydrocarbons in soil is expected to be limited because petroleum hydrocarbons tend to strongly sorb to soil and have low to moderate solubilities in water. In addition, relatively low concentrations (all less than criteria) in groundwater also support the conclusion that TPH is not very mobile in soil. As a result, it is expected that the further migration of petroleum hydrocarbons from soil to groundwater and the continued migration with groundwater toward the Bay would be limited.

4.3.9 Redevelopment Block EOS-1

This section summarizes the site characterization of Redevelopment Block EOS-1, including the site history (see Section 4.3.9.1), the geology and hydrogeology (see Section 4.3.9.2), the nature and extent of chemicals in soil (see Section 4.3.9.3), the nature and extent of chemicals in groundwater (see Section 4.3.9.4), and the fate and transport of chemicals in soil and groundwater (see Section 4.3.9.5). The planned reuse for this redevelopment block is open space. No tenants are currently present on this redevelopment block.

4.3.9.1 Site History

Redevelopment Block EOS-1 is located in the southwestern portion of Parcel E. This redevelopment block includes portions of two IR sites: IR-02 Northwest and IR-02 Central. Site features within Redevelopment Block EOS-1 are shown on Figure 1-13.

The subsections below discuss the historical uses of the portions of IR-02 Northwest and IR-02 Central within the boundaries of Redevelopment Block EOS-1.

4.3.9.1.1 IR-02 Northwest

IR-02 Northwest is located in the northern portion of Redevelopment Block EOS-1. Most of IR-02 Northwest lies within Redevelopment Block EOS-1, with only the eastern-most portion extending into Redevelopment Block 44. IR-02 Northwest covers approximately 8.9 acres and consists of the following site features within Redevelopment Block EOS-1 (see Figure 1-13):

- Disposal Dump Area (shown as IR-02 Northwest and Central removal area)
- Triple A Sites 2 and 14

In May 2005, the Navy issued an Action Memorandum to document the decision to undertake a TCRA for the PCB hotspot area at Parcels E and E-2. The PCB hotspot area is a 3.5-acre area of contaminated soil located primarily in Parcel E-2, with a small section of the excavation extending into Parcel E at IR-02 Northwest (see Figure 2-4). Soils in the area contain elevated concentrations of PCBs and TPH. The PCB hotspot area is located within a radiologically impacted area known to contain radioactive materials.

The Navy initiated the TCRA at the PCB hotspot area to reduce human and ecological risk from exposure to chemical and radiological contamination at the area. The TCRA, which began in 2005, has been completed, and the Final Completion Report was issued in 2007 (TtECI 2007a). The TCRA consisted of excavation, characterization, and off-site disposal of contaminated material. Approximately 44,500 cubic yards of material was excavated from the 3.4-acre excavation area. Of the 3.4-acre excavation area, only about 10,000 square feet (nine partial 50-foot by 50-foot grids) on the south end of the TCRA footprint was in Parcel E (see Figure 4-1 of TtECI 2007a). Within Parcel E, the maximum depth of excavation was 10 feet bgs. The TCRA goal was to excavate soil containing PCB concentrations greater than 1 milligram per kilogram (mg/kg) to a depths of 3 feet bgs or less; PCB concentrations greater than 100 mg/kg at depths greater than 3 feet bgs to a maximum depth of 10 feet bgs; and TPH concentrations greater than 3,500 mg/kg to a maximum depth of 10 feet bgs.

Remediation goals were exceeded for PCBs or TPH in bottom confirmation samples from one (Grid 132) of nine grids and in sidewall samples from seven (Grids 71, 117, 123, 131, 132, 138, and 139) of nine grids (see Figures 8-1 and 8-2 of TtECI 2007a). The highest residual concentration of PCBs and TPH in bottom confirmation samples was from Grid 132 at 6 feet bgs, which had a PCB concentration of 1.1 mg/kg and TPH of 14,008 mg/kg. The highest residual concentration of PCBs and TPH in sidewall confirmation samples was from Grid 177 at 2 feet bgs, which had a PCB concentration of 10 mg/kg and TPH of 33,037 mg/kg. Radioactive materials encountered during the removal action were segregated and disposed of as radioactive waste. The RAOs for removal of radioactive material were met in all grids. The excavation was lined with a geosynthetic liner to mark the extent of removed soil and the depth of clean backfill.

The TCRA was conducted in accordance with the Toxic Substances Control Act and its implementing regulations in Title 40 *Code of Federal Regulations* Section 761.61(c). All PCB and TPH contamination was not completely removed during the TCRA because of field

conditions and budgetary constraints. The Navy will address residual contamination and free-phase product on the shoreline and along the southwestern boundary, which is located in Parcel E, in a follow-on action. A detailed description of the TCRA is presented in the "Final Removal Action Completion Report, PCB Hot Spot Soil Excavation Site, Parcels E and E-2" (TtECI 2007a).

Disposal Dump Area

IR-02 Northwest was used by the Navy as a disposal site for industrial waste. Early Navy maps show an area in IR-02 Northwest referenced as the "disposal dump area" (PRC 1996b). Review of aerial photographs from 1948 to 1958 indicated that soils in this area were continuously excavated and filled with construction and industrial debris from other areas at HPS (PRC 1996c). During RI field activities conducted in the disposal dump area, construction and industrial debris were found to a maximum depth of 15 feet bgs; these materials included sandblast waste, paint chips, glass, cloth, plastic, paper, cardboard, styrofoam, metal, brick, wire, wood, nails, and pipe.

During routine maintenance operations on Navy ships and submarines, unserviceable equipment with radium-containing devices was removed and disposed of in the disposal dump area at IR-02 Northwest (PRC 1996d). These devices contain radium-226 mixed into phosphorescent paint. The paint was applied to make instrumentation visible at night without additional lighting.

Radium-containing devices buried at the disposal dump area at IR-02 Northwest include instrument dials, gauges, deck markers, and other electronic equipment components. Data from surface and subsurface investigations at IR-02 Northwest indicated that radium-containing devices were disposed of in an area of approximately 250 feet by 400 feet, to a maximum depth of 9 feet bgs (PRC 1996b). The boundaries of this area coincide with boundaries of the disposal dump area. Historical records indicated that the radium-containing devices were buried between 1960 and the early 1970s (PRC 1996d). The Navy initiated the TCRA at IR-02 Northwest and Central to eliminate any potential threat posed by future migration or release of radioactive material or non-radioactive chemicals from the site to the surrounding environment (TtECI 2005).

The TCRA, which began in 2005, has been completed, and the removal action completion report was issued in 2007 (TtECI 2007c). The TCRA consisted of radiological surveys, screening, sampling, excavation, off-site disposal of contaminated material, and post-excavation confirmation sampling. Excavated debris and soil were screened for radioactivity, and material that exceeded removal action criteria for radium-226, strontium-90, and cesium-137 was segregated for removal. Large debris, drums, and containers found within the excavation were also removed, profiled, and disposed of as hazardous or nonhazardous waste. The excavation was extended to Bay Mud or the maximum depth of 10 feet bgs. A total of 49,500 cubic yards of soil was excavated and screened for radioactive material. ABM was not observed during the TCRA at IR-02 Northwest and IR-02 Central.

Results of confirmation sampling from post-excavation bottom and sidewall locations show radium-226 exceeded the radiological remedial objective of 1.0 picoCurie per gram (pCi/g) in nine samples. The highest result for radium-226 was 6.225 pCi/g in Survey Unit 2, at location R130PE in the bottom of random Grid 130 (see Figure 4-3 in TtECI 2007c). Post-excavation samples for chemical characterization were collected at the bottom of the final depths of excavation. Results of the chemical characterization samples show that metals, PAHs, PCBs, and TPH concentrations exceeded screening criteria.

Soil stockpiles generated during excavation activities which do not containing radioactive contaminants, radioactively contaminated materials (including low-level mixed waste), or discrete radioactive point sources were sampled for chemical analysis. Soil samples from these soil stockpiles were analyzed for Title 22 metals; VOCs; SVOCs, including PAHs; pesticides; PCBs; and TPH-extractable. Samples were also collected and analyzed for asbestos, soluble threshold limit concentration, and toxicity characteristic leaching procedure as applicable. Soil samples were collected from this material at a frequency of one sample per 500 cubic yards. A minimum of five samples were collected from any stockpile smaller than 2,500 cubic yards. Results of the characterization sampling are included in Appendix E of the removal action completion report (TtECI 2007c).

Soil that was excavated from the site, passed radioisotope screening, and released for use as backfill was replaced in the excavation in the same order in which it was removed. Material that exhibited obvious staining or odor was sampled, but not used as backfill. Imported clean soil was used for the top 3 feet of the backfill, as a nonradioactive, nonhazardous soil cap, which covers all remaining radiological materials at the excavation site. A ground surface survey for gamma-emitting radionuclides was conducted within the unexcavated areas of IR-02 during demobilization. The survey identified three locations outside of the TCRA excavation boundary (Grids 40, 90, and 175) with elevated readings ranging from 10,000 to 89,000 counts per minute. No further investigation or removal was conducted at these three locations which are outside of the TCRA excavation boundary. The Navy concluded that the TCRA was completed successfully, and RAOs for the TCRA have been met (TtECI 2007c).

A radiological removal action work plan, covering all of HPS, was submitted in October 2007, and the Parcel E portion of the removal action is expected to be completed in 2012 (TtECI 2007c). This area will be addressed as part of the radiological removal action.

Triple A Sites 2 and 14

Triple A Sites 2 and 14 were identified in 1986 during the SFDA investigation of Triple A's hazardous waste disposal practices. These sites are adjacent to each other and are located along the shoreline of Parcel E near Parcel E-2. Portions of the Triple A sites lie within the disposal dump area. Triple A allegedly used both areas for the disposal of industrial debris. Triple A Site 2 was investigated because of the presence of industrial debris such as empty drums, wire insulation, paint cans, and sandblast waste (DHS 1988). Triple A Site 14 contained similar industrial debris, as well as acid tank parts, merchant boat parts, and building materials (DHS 1988). A waste tank and associated asbestos-lined piping were observed on the ground

surface at Triple A Site 14 (SFDA 1986). Industrial debris present at the surface at Triple A Sites 2 and 14 was removed by the Public Works Center sometime after November 1986 as part of routine facility maintenance operations.

4.3.9.1.2 IR-02 Central

IR-02 Central is located in the southern portion of Redevelopment Block EOS-1. Approximately half of IR-02 Central lies within Redevelopment Block EOS-1, and the remainder of the site is within Redevelopment Blocks 44, EOS-2, EOS-3, and EMI-1. IR-02 Central covers approximately 18 acres and consists of the Bay Fill Area and Triple A Site 18 within Redevelopment Block EOS-1 (see Figure 1-13).

The Navy and Triple A used locations throughout the central portion of the Bay Fill Area for storage of construction and industrial materials used in HPS operations (PRC 1996d). The Bay Fill Area was also used for the disposal of construction and industrial debris. The southwest corner of IR-02 Central is the former location of a small arms firing range (ERM-West 1988).

Triple A Site 18 was identified in 1986 during the SFDA investigation of Triple A hazardous waste disposal practices. Triple A Site 18 is located along the shoreline, directly south of the Building 600 parking area. Triple A Site 18 was investigated due to the presence of surface and subsurface industrial debris such as empty drums, paint cans, waste asphalt, furniture, fireboard, and sandblast waste (DHS 1988). During RI field activities, an area of soil apparently stained with waste oil was observed at the ground surface east of Triple A Site 18 (HLA 1988c).

The eastern portion of the disposal dump area described under IR-02 Northwest extends about 50 feet across the site boundary into IR-02 Central. Devices buried in the disposal dump area contain radium-226 mixed into phosphorescent paint. The paint was applied to make instrumentation visible at night without additional lighting. Radium-containing devices buried at the disposal dump area include instrument dials, gauges, deck markers, and other electronic equipment components. The Navy initiated the TCRA at IR-02 Northwest and Central to eliminate any potential threat posed by future migration or release of radioactive material or non-radioactive chemicals from the site to the surrounding environment (TtECI 2005). The TCRA, which began in 2005, has been completed, and the removal action completion report was issued in 2007 (TtECI 2007c). The TCRA activities at IR-02 Central were the same as described previously for the TCRA at the disposal dump area. A radiological removal action is expected to be completed in 2012.

4.3.9.2 Geology and Hydrogeology

This section briefly discusses the main geological and hydrogeological features that exist beneath Redevelopment Block EOS-1. A full description of geology and hydrogeology at Parcel E is presented in Section 3.4 and 3.5, respectively.

Most of Redevelopment Block EOS-1 is covered by ruderal vegetation. Approximately 30 percent of the surface in the east-central part of the redevelopment block is bare dirt. From the surface downward, the geologic units at IR-02 Central consist of Artificial Fill, Undifferentiated Upper Sand Deposits, Bay Mud Deposits, Undifferentiated Sedimentary Deposits, and Franciscan Complex bedrock. The Artificial Fill at Redevelopment Block EOS-1, which ranges from approximately 3 to 40 feet thick beneath the site, consists predominantly of dark greenish-gray to dark gray silty to clayey sand, with gravel, gravelly clay, or clayey gravel with sand, and occasional shell fragments. Serpentinite boulder fill was also encountered in several borings. The Undifferentiated Upper Sand Deposits occur only intermittently and appear to be predominantly absent from Redevelopment Block EOS-1. Where encountered, the Undifferentiated Upper Sand Deposits are approximately 3 to 7 feet thick and consist of poorly graded sand, with trace to 50 percent shell fragments. The Bay Mud Deposits consist predominantly of dark greenish-gray, fat clay, with trace to 25 percent shell fragments and 5 to 25 percent silt. Two borings drilled at Redevelopment Block EOS-1 penetrated the entire thickness (41 feet) of the Bay Mud Deposits. The Undifferentiated Sedimentary Deposits were encountered below the Bay Mud Deposits in both deep borings, but only one of the borings was drilled to bedrock; all other borings at the site were not drilled sufficiently deep to encounter the Undifferentiated Sedimentary Deposits. In the borings where Undifferentiated Sedimentary Deposits were encountered, the unit consists of gray to dark gray clay with minor, fine-grained sand, and varying mixtures of silt, clay, sand, and gravel. And in the one boring advanced to bedrock, the Undifferentiated Deposits were 221 feet thick. Franciscan Complex bedrock, which consists of olive-brown, moderately weathered serpentinite, was encountered in one boring drilled at IR-02 Central, at a depth of approximately 269 feet bgs. Bedrock is estimated at depths ranging from approximately 100 to greater than 250 feet below msl at the site (see Figure 3-8). The bedrock surface beneath this site dips from the northeast to southwest towards the Bay in the western portion and from east to west in the eastern portion of the block (parallel to the shoreline) (see Figure 3-8).

The hydrostratigraphy beneath Redevelopment Block EOS-1 consists of A-aquifer, an aquitard, and B-aquifer. The A-aquifer consists of artificial fill and upper differentiated sand deposits. Based on average groundwater elevations measured in A-aquifer wells, the depth to groundwater in the A-aquifer ranges from 5.9 to 12.9 feet bgs throughout the redevelopment block. Groundwater flow in the A-aquifer at Redevelopment Block EOS-1 is generally southwest and south toward the shoreline in Redevelopment Block EOS-1. The B-aquifer is separated from the A-aquifer by the Bay Mud aquitard (see Figure 3-7). Beneath Redevelopment Block EOS-1, the A- and B-aquifers are not in direct hydraulic communication. The general direction of groundwater flow for the B-aquifer is approximately southeast (see Figures 3-11 and 3-12).

4.3.9.3 *Nature and Extent of Chemicals in Soil*

This section summarizes the evaluation of the nature and extent of chemicals in soil within the boundary of Redevelopment Block EOS-1. The evaluation follows the approach for identifying chemicals and their spatial extent described in Section 4.1.

4.3.9.3.1 Identification and Spatial Distribution of Chemicals in Soil

This section summarizes the chemicals identified in soil at Redevelopment Block EOS-1. Approximately 251 soil samples were collected at Redevelopment Block EOS-1. Figure 4.3.9-1 shows the locations where soil samples were collected from within Redevelopment Block EOS-1. Soil samples were analyzed for metals (including hexavalent chromium), VOCs, SVOCs (including PAHs), cyanide, pesticides, PCBs, and TPH.

Tables 4.3.9-1 and 4.3.9-2 present the summary statistics for chemicals that were detected at concentrations exceeding the soil screening criteria (shown in Table 4-1). Table 4.3.9-1 presents statistics for 194 surface (0 to 10 feet bgs) soil samples. Table 4.3.9-2 presents statistics for 45 subsurface (deeper than 10 feet bgs) soil samples. Appendix C includes the complete soil data set used to generate the summary statistics tables for this redevelopment block.

The chemicals detected in soil are described below by analytical group: metals, VOCs, SVOCs, cyanide, pesticides, PCBs, and TPH.

Metals

The risk due to metals is primarily in the upper 10 feet of soil (see Appendix I); therefore, this discussion focuses on the data for metals in surface soil samples. Twenty-three metals were detected in soil samples collected from the surface to a depth of 10 feet bgs. Of the 23 metals detected, 15 metals were detected at concentrations exceeding the residential soil screening criteria; four metals were detected at concentrations that exceeded industrial soil screening criteria.

The lateral extent of elevated concentrations of metals was evaluated to identify areas within Redevelopment Block EOS-1 where the metals exceeded Parcel E industrial screening criteria in soil. Figure 4.3.9-2 shows the sampling locations where concentrations of metals exceeded Parcel E industrial screening criteria and presents the elevated concentrations at each location. Concentrations of metals exceeded the screening criteria in soil at the following contiguous sampling locations:

- Northern portion of Redevelopment Block EOS-1
- Southwest of Building 600
- South of Building 600
- Southeastern portion of Redevelopment Block EOS-1

Concentrations at isolated locations also exceeded the screening criteria; none of the isolated locations of metals are indicative of a source area.

The area in the northern portion of Redevelopment Block EOS-1 is associated with the disposal dump area used by the Navy for disposal of industrial waste and with Triple A Sites 2 and 14, which Triple A used for industrial waste disposal. Activities related to the disposal areas may have resulted in releases of metals. In addition, the random and undocumented use of sandblast waste as fill material in this area may be an additional source of metals contamination. The area southwest of Building 600 is associated with a firing range. The firing range may have resulted in a release of lead. Activities in the area south of the firing range are not known, but may have resulted in releases of metals. The areas south of Building 600 and along the southeastern portion of Redevelopment Block EOS-1 are associated with the Bay Fill Area used by the Navy and Triple A for storage of construction and industrial materials and for disposal of construction and industrial debris. Activities related to the storage and disposal area may have resulted in releases of metals.

Volatile Organic Compounds

Twenty-four VOCs were detected in soil samples collected from the surface to 10 feet bgs; five VOCs were detected at concentrations exceeding the Parcel E residential screening criteria (see Figure 4.3.9-3 and Table 4.3.9-1). Four of the VOCs exceeded the residential criteria in only one sample. Naphthalene exceeded residential criteria in four samples, and was the only VOC detected in soil samples collected deeper than 10 feet bgs at only one sample location. Only one VOC exceeded industrial soil screening criteria, in one isolated location. As a result, the nature and extent of VOC in soil at Redevelopment Block EOS-1 is not discussed further in this section.

Semivolatile Organic Compounds

Thirty-five SVOCs were detected in one or more soil samples collected from the surface to 10 feet bgs; eleven SVOCs were detected at concentrations exceeding Parcel E residential screening criteria, seven of which exceeded the Parcel E industrial screening criteria (see Table 4.3.9-1). Five SVOCs were detected at concentrations exceeding residential screening criteria in samples collected from greater than 10 feet bgs; three exceeded the industrial screening criteria.

The lateral extent of elevated concentrations of SVOCs was evaluated to identify areas within Redevelopment Block EOS-1 where SVOCs exceeded Parcel E industrial screening criteria in soil. Figure 4.3.9-4 shows the sampling locations where concentrations of SVOCs exceeded Parcel E industrial screening criteria and presents the elevated concentrations at each location. Concentrations of SVOCs exceeded the screening criteria in soil at the following contiguous sampling locations:

- Northern portion of Redevelopment Block EOS-1
- Southwest of Building 600
- South of Building 600
- Southeastern portion of Redevelopment Block EOS-1

The area in the northern portion of Redevelopment Block EOS-1 is associated with the disposal dump area the Navy used for disposal of industrial waste and with Triple A Sites 2 and 14, which Triple A used for industrial waste disposal. Activities related to the disposal areas may have resulted in releases of SVOCs. The areas south of Building 600 and along the southeastern portion of Redevelopment Block EOS-1 are associated with the Bay Fill Area the Navy and Triple A used to store construction and industrial materials and to dispose of construction and industrial debris. Activities related to the storage and disposal area may have resulted in releases of SVOCs.

Cyanide

Cyanide was detected in two out of 12 soil samples in soil samples collected from the surface to 10 feet bgs and in two out of 12 soil samples in soil samples collected deeper than 10 feet bgs; the detected concentrations did not exceed the Parcel E residential or industrial screening criteria (see Appendix C). As a result, the nature and extent of cyanide in soil at Redevelopment Block EOS-1 is not discussed further in this section.

Pesticides

Twenty-two pesticides were detected in soil samples collected from the surface to 10 feet bgs; five pesticides were detected at concentrations exceeding the Parcel E residential screening criteria; only one pesticide was detected at concentrations exceeding industrial screening criteria. The pesticides with concentrations exceeding the residential and industrial criteria were found in one or two isolated locations (see Figure 4.3.9-5). Three pesticides were detected in soil samples collected deeper than 10 feet bgs; none at concentrations exceeding Parcel E residential or industrial screening criteria. As a result, the nature and extent of pesticides in soil at Redevelopment Block EOS-1 is not discussed further in this section.

Polychlorinated Biphenyls

Seventeen PCBs were detected in soil samples collected from the surface to 10 feet bgs (see Table 4.3.9-1). In total, 176 samples were analyzed for PCBs with standard Aroclor speciation. Six samples were analyzed to further speciate for congener-specific PCBs (for example, PCB-028), as shown in Table 4.3.9-1. The screening process was limited to the Aroclor species. Four Aroclor PCBs were present at concentrations exceeding the residential screening criteria, and two Aroclor PCBs exceeded the industrial criteria. For soil samples collected deeper than 10 feet bgs, two PCBs were detected at concentrations exceeding the residential criteria; one PCB exceeded the industrial criteria.

The lateral extent of elevated concentrations of PCBs was evaluated to identify areas within Redevelopment Block EOS-1 where PCBs exceeded Parcel E industrial screening criteria in soil. Figure 4.3.9-5 shows the sampling locations where concentrations of PCBs exceeded Parcel E industrial screening criteria and presents the elevated concentrations at each location. Concentrations of PCBs exceeded the screening criteria in soil at the following contiguous sampling locations:

- Northern portion of Redevelopment Block EOS-1
- Southwest of Building 600
- Southeastern portion of Redevelopment Block EOS-1

The area in the northern portion of Redevelopment Block EOS-1 is associated with the disposal dump area the Navy used for disposal of industrial waste and with Triple A Sites 2 and 14, which Triple A used for industrial waste disposal. Activities related to the disposal areas may have resulted in releases of PCBs. The southeastern portion of Redevelopment Block EOS-1 is associated with the bay fill area the Navy and Triple A used to store construction and industrial materials and to dispose of construction and industrial debris. Activities related to the storage and disposal area may have resulted in releases of PCBs.

Total Petroleum Hydrocarbons

TPH concentrations exceeded the soil source screening criterion in eight samples; several of the locations were collocated with CERCLA contaminants. No free product was detected in monitoring wells within this block (Tetra Tech 2002c).

The lateral extent of elevated concentrations of TTPH was evaluated to identify areas within Redevelopment Block EOS-1 where the TTPH exceeded the soil source screening criterion in soil. Figure 4.3.9-5 shows the sampling locations where concentrations of TTPH exceeded the soil source screening criterion and presents the elevated concentrations at each location. Concentrations of TTPH exceeded the screening criterion in soil at contiguous sampling locations in the northern portion of Redevelopment Block EOS-1 outside of CAA5. The areas with elevated concentrations of TTPH are collocated with the areas with elevated concentrations of metals, SVOCs, and PCBs. TTPH concentrations at two other isolated locations also exceeded the screening criteria; none of the isolated locations of TTPH are indicative of a source area.

The area in the northern portion of Redevelopment Block EOS-1 is associated with the disposal dump area the Navy used for disposal of industrial waste and with Triple A Sites 2 and 14, which Triple A used for industrial waste disposal. Activities related to the disposal areas may have resulted in releases of TTPH.

4.3.9.3.2 Extent of Chemicals in Soil

The screening process identified four areas within Redevelopment Block EOS-1 where concentrations of representative chemicals in soil at contiguous sampling locations exceeded Parcel E screening criteria:

- Area in the northern portion of Redevelopment Block EOS-1: metals, SVOCs, PCBs, and TTPH (see Figures 4.3.9-2, 4.3.9-4, and 4.3.9-5)
- Area southwest of Building 600, former firing range and area south of firing range: metals, SVOCs, and PCBs (see Figures 4.3.9-2, 4.3.9-4, and 4.3.9-5)
- Area south of Building 600: metals and SVOCs (see Figures 4.3.9-2 and 4.3.9-4)
- Area southeast of Building 600 (southeastern portion of Redevelopment Block EOS-1): metals, SVOCs, and PCBs (see Figures 4.3.9-2, 4.3.9-4, and 4.3.9-5)

The area in the northern portion of Block EOS-1 is associated with the disposal dump area used by the Navy for disposal of industrial waste and with Triple A Sites 2 and 14, which were used by Triple A for industrial waste disposal. Activities related to the disposal areas may have resulted in releases of metals, SVOCs, PCBs and TTPH. In addition, the undocumented use of sandblast waste as fill material in this area may be an additional source of metals contamination. A radiological removal action is expected to be completed in 2012. The estimated size of the area is 350 feet (east-west) by 600 feet (north-south). The depth to groundwater is 8.0 to 11.1 feet bgs.

The southwest of Building 600 is associated with a firing range identified on aerial photographs (Tetra Tech 2002a). The firing range may have resulted in a release of lead. Only one sample location had concentrations in excess of the Parcel E industrial screening criteria. The estimated size of the area is 50 feet (east-west) by 50 feet (north-south). Activities in the area south of the firing range are not known, but may have resulted in releases of metals, SVOCs, and PCBs. The estimated size of the area is 150 feet (east-west) by 120 feet (north-south). The depth to groundwater is 8.5 feet bgs.

The area south of Building 600 is associated with the Bay Fill Area used by the Navy and Triple A for storage of construction and industrial materials and for disposal of construction and industrial debris. Activities related to the storage and disposal area may have resulted in releases of metals and SVOCs. The estimated size of the area is 175 feet (east-west) by 80 feet (north-south). The depth to groundwater is about 9 feet bgs.

The area southeast of Building 600 (southeastern portion of Redevelopment Block EOS-1) is also associated with the Bay Fill Area used by the Navy and Triple A for storage of construction and industrial materials and for disposal of construction and industrial debris. Activities related to the storage and disposal area may have resulted in releases of metals, SVOCs, and PCBs. The estimated size of the area is 200 feet (east-west) by 120 feet (north-south). The depth to groundwater is about 9 feet bgs.

4.3.9.4 Nature and Extent of Chemicals in Groundwater

This section summarizes the evaluation of the nature and extent of chemicals detected in groundwater samples collected from monitoring wells associated with Redevelopment Block EOS-1. Figure 4.3.9-6 shows the locations of the groundwater monitoring wells associated with Redevelopment Block EOS-1 where groundwater samples were collected for this evaluation.

Tables 4.3.9-3 and 4.3.9-4 present the summary statistics for chemicals that were detected in the A-aquifer and the B-aquifer, respectively. No bedrock water-bearing zone wells are associated with Redevelopment Block EOS-1. Table 4.3.9-3 presents statistics for data from nine A-aquifer wells; Table 4.3.9-4 presents statistics for data from one B-aquifer well. Chemicals that were retained for evaluation based on consideration of the factors described in Section 4.1.2.2 are shaded and shown in bold font in these tables. Appendix D includes the complete groundwater data set for this redevelopment block.

4.3.9.4.1 Chemicals in A-Aquifer Groundwater

Nine A-aquifer wells are associated with Redevelopment Block EOS-1 (see Figure 4.3.9-6). Groundwater samples collected from the A-aquifer wells were analyzed for metals (including hexavalent chromium), VOCs, SVOCs, cyanide, pesticides, PCBs, and TPH. Cyanide was not detected in any groundwater samples collected from A-aquifer wells associated with Redevelopment Block EOS-1; therefore, this chemical is not discussed further in this section.

The chemicals that were detected in groundwater samples collected from the A-aquifer are evaluated below by analytical group: metals, VOCs, SVOCs, pesticides, PCBs, and TPH.

Metals

Samples collected from the A-aquifer wells associated with Redevelopment Block EOS-1 were analyzed for metals during one or more rounds of sampling; 24 metals were detected. Of the 24 metals detected, 9 metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc) exhibited concentrations exceeding the appropriate screening criteria (surface water criteria, or HGALs if greater than surface water criteria) listed in Table 4.3.9-3. The spatial and temporal distributions of these seven metals are discussed below.

- Arsenic exceeded its surface water criterion (36 µg/L) and its HGAL (27.34 µg/L) in only one groundwater sample, collected from IR02MWB-1 in July 1992, with a concentration of 50.9 µg/L (65.8 µg/L in the duplicate sample). This well is located approximately 100 feet from the Bay. Arsenic was not detected above a concentration of 9.6 µg/L in any of the five subsequent samples from well IR02MWB-1 collected from August 1992 through November 2004.

- Cadmium exceeded its surface water criterion (8.8 µg/L) and its HGAL (5.08 µg/L) in 3 of 54 samples. The three exceedances were detected in samples collected from IR02MW141A in July 1992 (113 µg/L), IR02MW373A in March 2001 (10.8 µg/L), and IR02MWB-3 in July 1992 (23.6 µg/L). Wells IR02MW141A and IR02MW373A are located approximately 200 feet from the Bay, and well IR02MWB-3 is located approximately 75 feet from the Bay. Cadmium was not detected above a concentration of 3.6 µg/L in any of the four subsequent samples collected from well IR02MW141A in 1992, 2001, and 2002. Cadmium was not detected above a concentration of 8.36 µg/L in either of the two subsequent samples collected from well IR02MW373A in July and September 2002. Cadmium was not detected above a concentration of 0.32 µg/L in any of the seven subsequent samples collected from well IR02MWB-3 in 1992, 2001, 2002, and 2004.
- Chromium exceeded its surface water criterion (50 µg/L) and its HGAL (15.66 µg/L) in 5 of 57 samples. The five exceedances were detected in samples collected from IR02MW141A, IR02MWB-1, IR02MWB-2, and IR02MWB-3 in July 1992 (491, 472, 544, and 242 µg/L, respectively), and IR02MWB-2 in June 2004 (56.1 µg/L). Wells IR02MW141A and IR02MWB-3 are located approximately 200 feet and 75 feet from the Bay, respectively, and wells IR02MWB-1 and IR02MWB-2 are located approximately 100 feet from the Bay. Chromium was not detected in the subsequent four samples collected from well IR02MW141A in 1992, 2001, and 2002. Chromium was not detected above 6.6 µg/L in the subsequent five samples collected from well IR02MWB-1 in 1992, 2001, 2002, and 2004. Chromium was not detected at concentrations exceeding the PQL of 22 µg/L, in the subsequent two samples collected from well IR02MWB-2 in September and November 2004. Chromium was not detected in the subsequent seven samples collected from well IR02MWB-3 in 1992, 2001, 2002, and 2004.
- Copper exceeded its surface water criterion (3.1 µg/L) and its HGAL (28.04 µg/L) in 12 of 66 samples. The 12 exceedances were detected in samples collected from six wells (IR02MW126A, IR02MW141A, IR02MW373A, IR02MWB-1, IR02MWB-2, and IR02MWB-3) from July 1992 through June 2004. Only samples collected from wells IR02MW126A (located approximately 100 feet from the Bay) and IR02MW373A (located approximately 200 feet from the Bay) exhibited copper concentrations exceeding screening criteria since 1992. The table on the following page summarizes the analytical results for copper for these two wells, with the HGAL exceedances highlighted in bold.

Sampling Location	Sample Date	Copper (µg/L)	Qualifier
IR02MW126A	01-06-1992	2.8	
	07-08-1992	4	U
	07-08-1992	161	
	08-25-1992	1.8	U
	03-13-2001	18.7	J
	08-15-2002	4	U
	09-24-2002	8	U
	06-10-2004	43.2	
	09-10-2004	10.8	
	11-17-2004	5	U
IR02MW373A	11-21-1995	4.1	
	03-04-1996	1210	
	05-10-1996	782	
	03-26-2001	1300	
	07-23-2002	369	
	09-17-2002	241	

IR02MW373A is the only well with sample results that consistently exceeded the A-aquifer screening criterion after 1992. This well is located approximately 200 feet from the Bay. The 2004 copper groundwater plume in Redevelopment Block EOS-1, shown on Figure 4-3, was defined by the extent of copper based on the 2004 quarterly groundwater monitoring data (see Table 4-3). The 2004 analytical results indicated that the plume was limited to an area around one well (IR02MW373A), in the northern portion of the redevelopment block. However, copper concentrations in samples collected from well IR02MW126A after December 2004 appear to have fluctuated between 49.4 and 1000 µg/L from the first quarter of 2005 to the second quarter of 2007. The last copper concentration (68.2 µg/L) was measured in the second quarter of 2007. All post-2004 results for copper obtained from this well consistently exceeded the A-aquifer screening criterion, indicating that copper plume in groundwater at IR-02 Northwest may be expanding.

- Lead exceeded its surface water criterion (5.6 µg/L) and its HGAL (14.44 µg/L) in 9 of 60 samples. The nine exceedances were detected in samples collected from five wells (IR02MW126A, IR02MW141A, IR02MW373A, IR02MWB-2, and IR02MWB-3) from July 1992 through September 2002. Only samples collected from well IR02MW373A (located approximately 200 feet from the Bay) exhibited lead concentrations exceeding screening criteria since 1992. This well is located approximately 200 feet from the Bay. The table on the following page summarizes the analytical results for lead for this well, with the HGAL exceedances highlighted in bold.

Sampling Location	Sample Date	Lead (µg/L)	Qualifier
IR02MW373A	11-21-1995	3.7	
	03-04-1996	28.7	J
	05-10-1996	17.4	
	03-26-2001	24	
	07-23-2002	17.6	
	09-17-2002	35.2	

IR02MW373A is the only well with analytical results consistently exceeding the A-aquifer screening criterion after 1992. The 2004 lead groundwater plume in Redevelopment Block EOS-1, shown on Figure 4-3, was defined by the extent of lead based on the 2004 quarterly groundwater monitoring data (see Table 4-3). The 2004 analytical results indicated that the plume was limited to an area around one well (IR02MW373A), in the northern portion of the redevelopment block. The presence of lead in A-aquifer groundwater at Redevelopment Block EOS-1 is likely related to its presence in soils at IR-02 Northwest.

- Mercury exceeded its surface water criterion (0.025 µg/L) and its HGAL (0.6 µg/L) in three groundwater samples, collected from wells IR02MW141A, IR02MWB-2, and IR02MWB-3 in July 1992, with concentrations ranging from 1.7 to 54 µg/L. These wells are located approximately 75 to 200 feet from the Bay. Mercury was not detected in any of the subsequent samples collected from these wells.
- Nickel exceeded its surface water criterion (8.2 µg/L) and its HGAL (96.48 µg/L) in 17 of 60 groundwater samples. The 17 exceedances were detected in samples collected from five wells (IR02MW141A, IR02MW373A, IR02MWB-1, IR02MWB-2, and IR02MWB-3), with concentrations ranging from 120 to 1,720 µg/L. Nickel detections have not exceeded the HGAL in samples collected from either IR02MW141A or IR02MWB-3 subsequent to 1992. Wells IR02MWB-1 and IR02MWB-2 are located approximately 100 feet from the Bay and well IR02MW373A is located approximately 200 feet from the Bay. The table on the following page summarizes the analytical results for nickel for these wells, with the HGAL exceedances highlighted in bold.

Sampling Location	Sample Date	Nickel (µg/L)	Qualifier
IR02MW373A	11-21-1995	28.9	
	03-04-1996	543	
	05-10-1996	554	
	03-26-2001	1,460	
	07-23-2002	753	
	09-17-2002	452	
IR02MWB-1	01-13-1992	92.1	J
	01-13-1992	88.3	J
	07-07-1992	596	J
	07-07-1992	1,470	J
	08-27-1992	696	
	03-15-2001	240	
	03-15-2001	198	
	08-16-2002	7.2	J
	09-20-2002	48.8	
	11-30-2004	9.6	
IR02MWB-2	01-07-1992	125	J
	07-07-1992	235	J
	08-27-1992	71.1	
	03-28-2001	1,720	
	07-24-2002	505	
	09-24-2002	120	
	06-10-2004	277	
	09-14-2004	364	
	11-22-2004	76.2	
	11-22-2004	60.3	

IR02MW373A and IR02MWB-2 are the only wells with analytical results consistently exceeding the A-aquifer screening criterion after 2001. The 2004 nickel groundwater plume in Redevelopment Block EOS-1, shown on Figure 4-3, was defined by the extent of nickel based on the 2004 quarterly groundwater monitoring data (see Table 4-3). The 2004 analytical results indicated that two plumes are present, limited to areas around these two wells in the northern and central portion of the redevelopment block. Well IR02MW373A is located in IR-02 Northwest and well IR02MWB-2 is located in IR-02 Central. The presence of nickel in A-aquifer groundwater at Redevelopment Block EOS-1 is likely related to its presence in soils at the IR-02 Northwest and IR-02 Central.

- Silver exceeded its surface water criterion (0.38 µg/L) and its HGAL (7.43 µg/L) in only one groundwater sample, collected from well IR02M141A in 1992, with a concentration of 67.2 µg/L (68.9 µg/L in the duplicate sample). This well is located approximately 200 feet from the Bay. Silver was not detected above 0.3 µg/L in any of the four subsequent samples collected from this well in 1992, 2001, and 2002.

- Zinc exceeded its surface water criterion (81 µg/L) and its HGAL (75.68 µg/L) in 17 of 63 groundwater samples, with concentrations ranging from 88.5 to 31,100 µg/L. The 17 exceedances were detected in samples collected from six wells (IR02MW126A, IR02MW141A, IR02MW373A, IR02MWB-1, IR02MWB-2, and IR02MWB-3). After 1992, zinc was detected at concentrations above the surface water criteria in samples from only three of these wells (IR02MW126A, IR02MW373A, and IR02MWB-3). The table below summarizes the analytical results for zinc for these wells, with the surface water criterion exceedances highlighted in bold.

Sampling Location	Sample Date	Zinc (µg/L)	Qualifier
IR02MW126A	03-13-2001	37.5	
	08-15-2002	240	
	09-24-2002	98.6	U
	06-10-2004	252	J
	09-10-2004	221	
	11-17-2004	157	
IR02MW373A	11-21-1995	39.7	U
	03-04-1996	4200	
	05-10-1996	3500	
	03-26-2001	9970	
	07-23-2002	4930	
	09-17-2002	2970	
IR02MWB-3	08-27-1992	16.5	U
	08-27-1992	16.5	U
	03-15-2001	91	J
	03-15-2001	88.5	J
	07-19-2002	11	U
	09-23-2002	2	U
	06-17-2004	37.5	J
	09-17-2004	50	U
	11-23-2004	100	U

The 2004 zinc groundwater plume in Redevelopment Block EOS-1, shown on Figure 4-3, was defined by the extent of zinc based on the 2004 quarterly groundwater monitoring data (see Table 4-3). IR02MW126A and IR02MW373A are the only wells with analytical results consistently exceeding the A-aquifer screening criterion after 2001. The 2004 analytical results indicated that the zinc plume is limited to the area around these two wells, in the northern portion of the redevelopment block. Zinc concentrations in samples collected from well IR02MW126A after December 2004 appear to have fluctuated between 241 and 2,320 µg/L from the first quarter of 2005 to the second quarter of 2007. The last zinc concentration (241 µg/L) was measured in the second quarter of 2007. All post-2004 results for zinc obtained from this well consistently exceeded the A-aquifer screening criterion, indicating that zinc plume in groundwater at IR-02 Northwest may be expanding.

Copper, lead, nickel, and zinc in A-aquifer groundwater at Redevelopment Block EOS-1 are discussed further in Section 4.3.9.5. The presence of copper, lead, and zinc in groundwater may be due in part to the use of spent ABM as fill in addition to the presence of these metals in soil. Spent ABM was found when the radium dial disposal area in IR-02 Northwest and Central was excavated. In addition, significant quantities of copper wire were found in the vicinity of at least one well in this area. ABM is a potential source of copper, lead, and zinc in groundwater. The presence of these metals in A-aquifer groundwater at Redevelopment Block EOS-1 is also likely related to their presence in soils at IR-02 Northwest and IR-02 Central. The IR-02 Northwest land area was created with Artificial Fill materials, including serpentinite bedrock, excavated Bay Mud, sands, gravel, construction debris, industrial debris, and sandblast waste. Soils at IR-02 Northwest were consistently excavated and filled with soil and industrial materials from other areas at HPS. IR-02 Central is the central portion of the Bay Fill Area, an area created by filling in the Bay margin with quarried materials consisting primarily of serpentinite bedrock from the HPS peninsula (PRC 1996c). Other materials used to create the Bay Fill Area may have included excavated Bay Mud, sands, gravel, construction debris (such as brick, concrete, and wood), industrial debris (such as metals pipes, plastics, and tires), and sandblast waste. However, the filling history of this area is not well documented.

Volatile Organic Compounds

Samples collected from the A-aquifer wells associated with Redevelopment Block EOS-1 were analyzed for VOCs during one or more rounds of sampling; 22 VOCs were detected. Of the 22 VOCs detected, 7 VOCs (1,4-DCB, benzene, carbon tetrachloride, naphthalene, PCE, TCE, and vinyl chloride) exceeded at least one of the appropriate screening criteria (vapor intrusion and surface water criteria) listed in Table 4.3.9-3. The spatial and temporal distributions of these seven VOCs are discussed below.

- 1,4-DCB exceeded its vapor intrusion criterion (2.1 µg/L) in 1 of 55 groundwater samples. The single exceedance (2.2 µg/L) was detected in a sample collected from well IR02MW126A in August 2002. 1,4-DCB was not detected above 1.6 µg/L in any of the four subsequent samples collected from this well in 2002 and 2004.
- Benzene exceeded its vapor intrusion criterion (0.37 µg/L) in 9 of 47 groundwater samples collected from two A-aquifer wells (IR02MW126A and IR02MW372A). The table on the following page summarizes the analytical results for benzene for these two A-aquifer wells, with the vapor intrusion criterion exceedances highlighted in bold.

Sampling Location	Sample Date	Benzene (µg/L)	Qualifier
IR02MW126A	01-06-1992	5	U
	07-08-1992	1	J
	07-08-1992	5	U
	08-25-1992	5	U
	08-15-2002	1.1	
	09-24-2002	0.92	
	06-10-2004	1.2	
	09-10-2004	1.1	J
	11-17-2004	0.32	J
IR02MW372A	11-22-1995	5	
	03-07-1996	2	J
	05-10-1996	3	
	03-26-2001	2	
	07-17-2002	0.34	J
	09-10-2002	0.22	J
	09-10-2002	0.22	J

The 2004 benzene groundwater plume in Redevelopment Block EOS-1, shown on Figure 4-4, was defined by the extent of benzene based on the 2004 quarterly groundwater monitoring data (see Table 4-4). The 2004 analytical results indicated that the plume was limited to an area around one well (IR02MW126A). The source of benzene in groundwater is unknown, but may be related to the disposal of industrial debris at IR-02 Northwest.

- Carbon tetrachloride exceeded its vapor intrusion criterion (0.046 µg/L) in 1 of 47 groundwater samples. The single exceedance (11 µg/L) was detected in a sample collected from well IR02MWB-2 in July 1992. Carbon tetrachloride was not detected in any of the four subsequent samples collected from this well in 1992, 2001, and 2002.
- Naphthalene exceeded its vapor intrusion criterion (3.6 µg/L) in 5 of 42 groundwater samples. The five exceedances were detected in samples collected from well IR02MW126A and IR02MW372A, with concentrations ranging from 5 to 12 µg/L. Naphthalene was not detected above the screening criterion in the last two samples collected from well IR02MW126A in September and November 2004. Naphthalene was detected in two of three samples collected from well IR02MW372A in 1995 and 1996, with estimated concentrations of 5 and 8 µg/L. No subsequent samples collected from this well have been analyzed for naphthalene. Both well IR02MW126A and well IR02MW372A are located in IR-02 Northwest. The source of naphthalene in groundwater at IR-02 Northwest is unknown, but may be related to the disposal of industrial debris at the site.

- PCE exceeded its vapor intrusion criterion (0.54 µg/L) in 2 of 47 groundwater samples. The two exceedances were detected in samples collected from well IR02MW141A in May 1992 (3 µg/L) and IR02MWB-2 July 1992 (2 µg/L). PCE was not detected in any of the five subsequent samples collected from well IR02MW141A or the four subsequent samples collected from well IR02MWB-2 in 1992 through 2004.
- TCE exceeded its vapor intrusion criterion (2.9 µg/L) in 1 of 47 groundwater samples. The single exceedance (4 µg/L) was detected in a sample collected from well IR02MW372A in November 1995. TCE was not detected above a concentration of 2 µg/L in any of the five subsequent samples collected from this well from 1996 through 2002. Samples collected from this well subsequent to 1996 have exhibited TCE concentrations ranging from 0.2 to 0.53 µg/L.
- Vinyl chloride exceeded its vapor intrusion criterion (0.028 µg/L) in 8 of 47 groundwater samples. The eight exceedances were detected in samples collected from wells IR02MW126A and IR02MW372A. The table below summarizes the analytical results for vinyl chloride for these two A-aquifer wells, with the vapor intrusion criterion exceedances highlighted in bold.

Sampling Location	Sample Date	Vinyl Chloride (µg/L)	Qualifier
IR02MW126A	01-06-1992	10	U
	07-08-1992	10	U
	07-08-1992	10	U
	08-25-1992	10	U
	08-15-2002	0.49	J
	09-24-2002	0.47	J
	06-10-2004	0.63	
	09-10-2004	0.5	U
IR02MW372A	11-17-2004	0.28	J
	11-22-1995	0.7	J
	03-07-1996	0.7	
	05-10-1996	0.8	
	03-26-2001	0.2	J
	07-17-2002	0.5	U
	09-10-2002	0.5	U
	09-10-2002	0.5	U

The most recent analytical results in the RI data set indicate that vinyl chloride is present in groundwater at concentrations exceeding the screening criterion only at well IR02MW126A, located in IR-02 Northwest. The source of vinyl chloride at IR-02 Northwest is unknown, but may be related to the disposal of industrial debris at this site.

Benzene, naphthalene, and vinyl chloride in A-aquifer groundwater at Redevelopment Block EOS-1 are discussed further in Section 4.3.9.5.

Semivolatile Organic Compounds

Samples collected from the A-aquifer wells associated with Redevelopment Block EOS-1 were analyzed for SVOCs during one or more rounds of sampling; 18 SVOCs were detected. Of the 18 SVOCs detected, none exceeded the appropriate screening criteria (vapor intrusion criteria and surface water criteria) listed in Table 4.3.9-3. As a result, SVOCs in A-aquifer groundwater at Redevelopment Block EOS-1 are not discussed further in this section.

Pesticides

Samples collected from the A-aquifer wells associated with Redevelopment Block EOS-1 were analyzed for pesticides during one or more rounds of sampling; 19 pesticides were detected (see Table 4.3.9-3). Of the 19 pesticides detected, 8 pesticides (4,4'-DDT, alpha-chlordane, dieldrin, endosulfan II, endrin, gamma-chlordane, heptachlor, and heptachlor epoxide) exhibited concentrations exceeding surface water criteria listed in Table 4.3.9-3. The spatial and temporal distributions of these eight PCBs are discussed below.

- 4,4'-DDT exceeded its surface water criterion (0.001 µg/L) in 4 of 39 groundwater samples. The four exceedances were detected in samples collected from Wells IR02MW372A and IR02MWB-3 in 1996 and 2001, with concentrations ranging from 0.008 to 0.3 µg/L. 4,4'-DDT was not detected in any of the two subsequent samples collected from Well IR02MW372A in 2002 or in the five subsequent samples collected from Well IR02MWB-3 in 2002 and 2004.
- Alpha-chlordane exceeded its surface water criterion (0.004 µg/L) in 2 of 39 groundwater samples. The two exceedances were detected in samples collected from well IR02MW372A in 1996 and 2002. The table below summarizes the analytical results for alpha-chlordane for this well, with the surface water criterion exceedances highlighted in bold.

Sampling Location	Sample Date	Alpha-Chlordane (µg/L)	Qualifier
IR02MW372A	11-22-1995	0.05	U
	03-07-1996	0.05	U
	05-10-1996	0.03	J
	03-26-2001	0.005	UJ
	07-17-2002	0.024	UJ
	09-10-2002	0.0088	J
	09-10-2002	0.0099	J

Well IR02MW372A is located in IR-02 Northwest. The source of alpha-chlordane is unknown, but may be related to facility-wide pest and weed abatement programs and may be indicative of the routine use of these materials.

- Dieldrin exceeded its surface water criterion (0.142 µg/L) in 2 of 39 groundwater samples. The two exceedances were detected in samples collected from Well IR02MW372A in March and May 1996, with concentrations of 0.3 µg/L. Dieldrin detections in samples collected from Well IR02MW372A in 2001 and 2002 were less than the surface water criterion, and dieldrin was not detected in the most recent sample in the RI data set collected from this well in September 2002.
- Endosulfan II exceeded its surface water criterion (0.0087 µg/L) in only 1 of 39 groundwater samples. The single exceedance (0.4 µg/L) was detected in a sample collected from Well IR02MW372A in March 1996. Endosulfan II was not detected in the subsequent four samples collected from well IR02MW372A in 1996, 2001, and 2002.
- Endrin exceeded its surface water criterion (0.0023 µg/L) in 2 of 39 groundwater samples. The two exceedances were detected in samples collected from well IR02MW372A in March 1996 (1 µg/L) and May 1996 (0.2 µg/L). Endrin was not detected in the subsequent three samples collected from this well in 2001 and 2002.
- Gamma-chlordane exceeded or equaled its surface water criterion (0.004 µg/L) in four of 39 groundwater samples. The four exceedances were detected in samples collected from Well IR02MW372A, with concentrations ranging from 0.05 to 0.3 µg/L. The table below summarizes the analytical results for gamma-chlordane for this well, with the surface water criterion exceedances highlighted in bold.

Sampling Location	Sample Date	Gamma-Chlordane (µg/L)	Qualifier
IR02MW372A	11-22-1995	0.05	U
	03-07-1996	0.07	
	05-10-1996	0.3	
	03-26-2001	0.05	J
	07-17-2002	0.0094	U
	09-10-2002	0.11	
	09-10-2002	0.1	

Well IR02MW372A is located in IR-02 Northwest. The source of gamma-chlordane is unknown but may be related to facility-wide pest and weed abatement programs and may be indicative of the routine use of these materials.

- Heptachlor exceeded its surface water criterion (0.004 µg/L) in 1 of 39 groundwater samples. The single exceedance (0.03 µg/L) was detected in a sample collected from well IR02MW372A in March 2001 and was qualified as estimated because it was below the PQL. Heptachlor was not detected in the subsequent two samples collected from this well in July and September 2002.
- Heptachlor epoxide exceeded its surface water criterion (0.004 µg/L) in 3 of 33 groundwater samples. The three exceedances were detected in samples collected from well IR02MW372A in March 1996, May 1996, and March 2001. The table below summarizes the analytical results for heptachlor epoxide for this well, with the surface water criterion exceedances highlighted in bold.

Sampling Location	Sample Date	Heptachlor Epoxide (µg/L)	Qualifier
IR02MW372A	11-22-1995	0.01	U
	03-07-1996	0.2	
	05-10-1996	0.2	
	03-26-2001	0.02	J

Well IR02MW372A is located in IR-02 Northwest. The source of heptachlor epoxide is unknown but may be related to facility-wide pest and weed abatement programs and may be indicative of the routine use of these materials.

Alpha-chlordane, gamma-chlordane, and heptachlor epoxide in A-aquifer groundwater at Redevelopment Block EOS-1 are discussed further in Section 4.3.9.5.

Polychlorinated Biphenyls

Samples collected from the A-aquifer wells associated with Redevelopment Block EOS-1 were analyzed for PCBs during one or more rounds of sampling; three PCBs (Aroclor-1242, Aroclor-1254, and Aroclor-1260) were detected (see Table 4.3.9-3). All of the PCB detections exceeded the surface water criterion (0.03 µg/L), which is less than the reported detection limits (ranging from 0.1 to 10 µg/L). The spatial and temporal distributions of the three detected PCBs are discussed below.

- Aroclor-1242 exceeded its surface water criterion (0.03 µg/L) in only one sample, collected from well IR02MW141A in May 1992, at a concentration of 2 µg/L. Aroclor-1242 was not detected in any of the five subsequent samples collected from this well from 1992 to 2002.
- Aroclor-1254 exceeded its surface water criterion (0.03 µg/L) in 9 of 42 samples collected from three A-aquifer wells; IR02MW141A, IR02MW372A, and IR02MWB-3. Aroclor-1254 was detected below the PQL in the sample collected from well IR02MW141A, and was not detected in the duplicated sample or the

subsequent five samples collected from this well from 1992 through 2002. Aroclor-1254 was detected in all eight samples collected from wells IR02MW372A and IR02MWB-3, with concentrations ranging from 0.1 to 40 µg/L. The table below summarizes the analytical results for Aroclor-1254 for these two A-aquifer wells, with the surface water criterion exceedances highlighted in bold.

Sampling Location	Sample Date	Aroclor-1254 (µg/L)	Qualifier
IR02MW372A	11-22-1995	10	
	03-07-1996	27	
	05-10-1996	35	
	03-26-2001	1	
IR02MWB-3	01-20-1992	18	
	07-10-1992	40	
	08-27-1992	23	
	08-27-1992	19	
	03-15-2001	0.1	

The 2004 Aroclor-1254 groundwater plume in Redevelopment Block EOS-1, shown on Figure 4-5, was defined by the extent of Aroclor-1254 based on the 2004 quarterly groundwater monitoring data (see Table 4-5). The 2004 analytical results indicated that the plume was limited to an area around wells IR02MW372A and IR02MWB-3, located in IR-02 Northwest. The source of Aroclor-1254 at IR-02 Northwest may be industrial disposal in the disposal dump area.

- Aroclor-1260 exceeded its surface water criterion (0.03 µg/L) in eight of 42 samples and in three of the nine A-aquifer wells; IR02MW126A, IR02MW141A, and IR02MW373A in 1992, 1995, and 1996. The maximum detected concentration of Aroclor-1260 (5 µg/L) was reported in a sample collected from well IR02MW141A in August 1992. Aroclor-1260 was not detected in any of the three or more samples collected from each of these wells subsequent to 1996.

Aroclor-1254 in A-aquifer groundwater at Redevelopment Block EOS-1 is discussed further in Section 4.3.9.5.

Total Petroleum Hydrocarbons

Samples collected from the A-aquifer wells associated with Redevelopment Block EOS-1 were analyzed for TPH products during one or more rounds of sampling. TPH-g, TPH-d, and TPH-mo were detected in groundwater samples collected from one, two, and two A-aquifer wells, respectively. The maximum concentrations detected of each TPH range varied from 33 to 1,500 µg/L (see Table 4.3.9-3). These maximum concentrations were all less than the TPH screening criteria for groundwater. As a result, TPH products in A-aquifer groundwater at Redevelopment Block EOS-1 are not discussed further in this section.

4.3.9.4.2 Chemicals in the B-Aquifer

One B-aquifer well is located within Redevelopment Block EOS-1 (see Figure 4.3.9-6). Groundwater samples collected from the B-aquifer well were analyzed for metals, VOCs, SVOCs, pesticides, PCBs, and TPH. SVOCs, pesticides, PCBs, and TPH were not detected in any groundwater samples collected from the B-aquifer well associated with Redevelopment Block EOS-1; therefore, these chemicals are not discussed further in this section. Table 4.3.9-4 presents the summary statistics for chemicals detected in samples collected from the B-aquifer well.

The chemicals that were detected in groundwater samples collected from the B-aquifer are evaluated below by the following analytical groups: metals and VOCs.

Metals

Samples collected from the B-aquifer well associated with Redevelopment Block EOS-1 were analyzed for metals during one or more rounds of sampling; 12 metals were detected. Groundwater samples collected from the B-aquifer well after 1992 were not analyzed for metals. Of the 12 metals detected, 3 metals (arsenic, lead, and manganese) exhibited concentrations exceeding one or more screening criteria (see Table 4.3.9-4). The spatial and temporal distribution of these three metals is discussed below.

- Arsenic exceeded its domestic use criterion (0.007 µg/L) in one of three groundwater samples. The single exceedance (2.1 µg/L) was detected in a sample collected from well IR02MW127B in January 1992. The single detection was qualified as estimated because it was below the PQL, and arsenic was not detected in the two subsequent samples collected from this well in July and August 1992.
- Lead exceeded its surface water criterion (5.6 µg/L) in one of three groundwater samples. The single exceedance (8.2 µg/L) was detected in a sample collected from well IR02MW127B in August 1992. The single exceedance was qualified as estimated because it was detected at a concentration below the PQL. This well is located approximately 300 feet from the Bay. Lead was not detected above its surface water criterion in the two preceding samples collected from this well in January and July 1992.
- Manganese exceeded its domestic use criterion (880 µg/L) in all three groundwater samples collected from well IR02MW127B in January, July, and August 1992, with concentrations ranging from 2,250 to 2,310 µg/L. The source of manganese in groundwater at this well is unknown, but is most likely the breakdown of components of the soils at this redevelopment block. Although HGALs were derived for the A-aquifer, the B-aquifer concentrations are below the HGAL and therefore may be assumed to be ubiquitous.

Metals in B-aquifer groundwater at Redevelopment Block EOS-1 are not discussed further in this section.

Volatile Organic Compounds

Samples collected from the B-aquifer well associated with Redevelopment Block EOS-1 were analyzed for VOCs during one or more rounds of sampling; two VOCs (toluene and trichlorofluoromethane) were detected. Neither of the VOCs were detected at concentrations exceeding one or more screening criteria (Table 4.3.9-4). As a result, VOCs in the B-aquifer at Redevelopment Block EOS-1 are not discussed further in this section.

4.3.9.4.3 Extent of Chemicals in Groundwater

The screening process identified 11 chemicals in A-aquifer groundwater within Redevelopment Block EOS-1 whose concentrations consistently exceeded Parcel E screening criteria (copper, lead, nickel, zinc, benzene, naphthalene, vinyl chloride, alpha-chlordane, gamma-chlordane, heptachlor epoxide, and Aroclor-1254). These chemicals were consistently identified above the screening criteria in five A-aquifer wells:

- Monitoring well IR02MW373A: copper, lead, nickel, and zinc (see Figure 4-3 and Table 4-3)
- Monitoring well IR02MWB-2: nickel (see Figure 4-3 and Table 4-3)
- Monitoring well IR02MW126A: zinc (see Figure 4-3 and Table 4-3), benzene, naphthalene, and vinyl chloride (see Figure 4-4 and Table 4-4)
- Monitoring well IR02MW372A: alpha-chlordane, gamma-chlordane, heptachlor epoxide, and Aroclor-1254 (see Figure 4-5 and Table 4-5), and naphthalene (see Figure 4-4 and Table 4-4)
- Monitoring well IR02MWB-3: Aroclor-1254 (see Figure 4-5 and Table 4-5)

All five of these wells are located within IR-02 Northwest. The source of metals in A-aquifer groundwater at Redevelopment Block EOS-1 is likely related to their presence in soils at IR-02 Northwest and IR-02 Central. In addition, the presence of copper, lead, and zinc in groundwater may be related to the use of spent ABM as fill material. Spent ABM was found when the radium dial disposal area in IR-02 Northwest and Central was excavated. In addition, significant quantities of copper wire were found in the vicinity of at least one well in this area. The source of VOCs in A-aquifer groundwater at IR-02 Northwest is unknown, but may be related to the disposal of industrial debris at this site. The presence of pesticides in A-aquifer groundwater at IR-02 Northwest is unknown but may be related to facility-wide pest and weed abatement programs and may be indicative of the routine use of these materials. The source of the PCB Aroclor-1254 at IR-02 Northwest may be industrial disposal in the disposal dump area.

4.3.9.5 *Evaluation of Chemical Fate and Transport*

As described in Sections 4.3.9.3 and 4.3.9.4, four areas were identified where soil sampling results exceeded Parcel E soil screening criteria and five wells were identified where groundwater sampling results exceeded Parcel E groundwater screening criteria in Redevelopment Block EOS-1. Chemicals identified in areas exceeding Parcel E screening criteria in soil are metals (copper, lead, and manganese); SVOCs; PCBs; and TPH. Metals (copper, lead, nickel, and zinc); VOCs (benzene, naphthalene, and vinyl chloride); pesticides; PCBs; and TPH were identified in groundwater at concentrations exceeding Parcel E screening criteria. The persistence and mobility of these representative chemicals in soil and groundwater is discussed below.

Metals

Arsenic

Arsenic was detected in soil at Redevelopment Block EOS-1 at concentrations exceeding industrial criteria. The mobility of arsenic is highly dependant on soil pH and infiltration of water. Soil pH within Redevelopment Block EOS-1 ranges from 6.2 to 12 (see Appendix C). The average pH calculated is 7.6, as described in Section 4.3.2.5. Only 3 of 80 pH measurements were below 7.0. Although arsenic may be somewhat mobile in the basic soils, its concentrations in groundwater have not exceeded Parcel E screening criteria. Therefore, the migration of arsenic from the vadose zone soils to groundwater appears to be limited.

Copper

Copper in soils and groundwater was identified for further evaluation at Redevelopment Block EOS-1. Copper is not volatile. Copper may form compounds that are water soluble and may be transported under the influence of groundwater flow and accompanying geochemical reactions, which are dependant on pH, complexation, oxidation, reduction, solubility, and sorption. Copper was detected in groundwater at concentrations exceeding Parcel E screening criteria, suggesting leaching at Redevelopment Block EOS-1. Copper concentrations in groundwater have generally decreased in samples subsequent to 1992; however, in well IR02MW373A, copper concentrations still exceeded Parcel E screening criteria in the most recent sample in the RI data set.

The estimated 2004 copper plume in groundwater at well IR02MW373A in Redevelopment Block EOS-1 is located very near to the Bay (see Figure 4-4). The leading edge of the plume is about 100 feet away from the shoreline.

Lead

Lead present in soils and groundwater was identified for further evaluation at Redevelopment Block EOS-1. Lead was detected in soil and groundwater at concentrations exceeding Parcel E screening criteria, suggesting leaching at Redevelopment Block EOS-1. However, lead concentrations in groundwater have generally decreased in samples subsequent to 1992 except at well IR02MW373A, where lead exceeded Parcel E screening criteria in the most recent sample in the RI data set.

Lead does not tend to be mobile in aquatic environments and appears to be readily sorbed to soil or aquifer materials and is nearly insoluble in water except for some manmade organo-lead compounds, which are water soluble and tend to be more mobile in the environment (see Appendix H). Lead complexed with organic matter appears to be readily sorbed, and carbonate, hydroxide, and sulfate lead complexes are nearly insoluble in water. The estimated 2004 lead plume in groundwater at well IR02MW373A in Redevelopment Block EOS-1 is located about 150 feet from the Bay (see Figure 4-4). Dissolved lead is more likely to precipitate out because of the presence of oxidizing conditions in the tidal mixing zone.

Nickel

Nickel is readily weathered in soil environments. The nickel salts of nitrate, chloride, and sulfate are all water soluble, and significant levels of these anions will enhance nickel mobility. In water, nickel may form soluble compounds with various ions, suggesting the increased mobility of nickel. At Redevelopment Block EOS-1, nickel is expected to be transported along with groundwater; its retardation due to sorption is expected to be relatively limited (see Appendix H).

Based on the maximum concentrations detected during the two most recent quarters of sampling in the RI data set in Redevelopment Block EOS-1, the 2004 nickel plume is estimated to include the area of Wells IR02MW373A and IR02MW149A, which are located near to the Bay (see Figure 4-4). The leading edge of the 2004 plume is less than 100 feet away from the shoreline.

Zinc

Zinc present in A-aquifer groundwater was identified for further evaluation at Redevelopment Block EOS-1. Zinc was detected at concentrations exceeding Parcel E screening criteria in samples from two wells (IR02MW373A and IR02MW126A) at Redevelopment Block EOS-1. The migration of zinc is expected to be very limited as a result of metal precipitation or sorption to soil under the alkaline conditions at Redevelopment Block EOS-1. Based on the tendency of zinc to sorb to soil or aquifer materials, the migration of zinc in groundwater is expected to be limited (see Appendix H). As a result, the potential for zinc to migrate in groundwater is relatively low. The estimated 2004 zinc plume in groundwater at Redevelopment Block EOS-1 is located less than 200 feet away from the Bay (see Figure 4-4).

Volatile Organic Compounds

Benzene

Benzene is highly soluble and has a relatively high vapor pressure. Based on an average TOC content of 2.6 percent in soil from 0 to 10 feet bgs at Redevelopment Block EOS-1, sorption of benzene to soil can be significant (see Section 4.2). However, the sorption of dissolved benzene to soils or aquifer materials is not expected to substantially affect its transport. The benzene exceedances in groundwater at Redevelopment Block EOS-1 suggest that benzene may have migrated from soil to groundwater. The 2004 plume extent estimated around IR02MW126A is very small and is about 100 feet away from the Bay (see Figure 4-4). Based on the decreasing trend of concentrations and low concentrations detected in samples in the RI data set, which were less than screening criteria, the potential for benzene to migrate from groundwater to the atmosphere is limited.

Naphthalene

Naphthalene was detected in A-aquifer groundwater at concentrations exceeding Parcel E screening criteria in samples from two wells (IR02MW126A and IR02MW372A) at Redevelopment Block EOS-1. Based on an average TOC content of 2.6 percent in soil from 0 to 10 feet bgs at Redevelopment Block EOS-1, the mobility of naphthalene in soil and sediments would be limited because it has (1) a very low solubility in water, (2) a relatively low vapor pressure, and (3) a tendency to strongly sorb to organic carbon in soil. As a result, the potential for naphthalene to migrate toward the Bay is very low.

Vinyl Chloride

Vinyl chloride was detected in A-aquifer groundwater at concentrations exceeding Parcel E screening criteria in samples from two wells (IR02MW126A and IR02MW372A) at Redevelopment Block EOS-1. Vinyl chloride is highly soluble and has a relatively high vapor pressure. Volatilization is an effective transport mechanism for vinyl chloride. Based on available data, vinyl chloride concentrations appear to decrease over time at wells IR02MW126A and IR02MW372A. Wells IR02MW126A and IR02MW372A are located near the shoreline. The higher groundwater velocities in response to tides would result in increased hydrodynamic dispersion and, therefore, would lead to further attenuation of vinyl chloride concentrations. As a result, the potential for vinyl chloride to migrate toward the Bay is expected to be very limited.

Semivolatile Organic Compounds

Benzo(a)anthracene and benzo(k)fluoranthene (as representative SVOCs) were detected at concentrations exceeding Parcel screening criteria in surface (0 to 10 feet bgs) soil, as well as at deeper depths (saturated soil). Based on an average TOC content of 2.6 percent in soil from 0 to 10 feet bgs at Redevelopment Block EOS-1, the mobility of these PAHs to soil would be limited

because these chemicals have (1) a very low solubility in water, (2) a low vapor pressure, and (3) a tendency to strongly sorb to organic carbon in soil. As a result, the potential for these chemicals to migrate from the vadose zone into groundwater is relatively low.

Pesticides

Alpha-chlordane, gamma-chlordane, and heptachlor epoxide were detected at concentrations exceeding screening criteria in groundwater. Aqueous solubilities of alpha-chlordane, gamma-chlordane, and heptachlor epoxide are low, and high concentrations of dissolved inorganic chemicals may further reduce the aqueous solubility of these insecticides (see Appendix H). Based on an average TOC content of 2.6 percent in soil from 0 to 10 feet bgs at Redevelopment Block EOS-1, the mobility of pesticides in soil would be limited because pesticides tend to strongly sorb to soil organic matter and have low solubilities in water. As a result, the potential for these pesticides to further migrate in groundwater is relatively low.

Polychlorinated Biphenyls

Aroclor-1260 in soils and Aroclor-1254 in groundwater were identified for further evaluation at Redevelopment Block EOS-1. Aroclor-1260 was detected in surface (0 to 10 feet bgs) soil at concentrations exceeding Parcel E screening criteria at Redevelopment Block EOS-1. Aroclor-1260 has very low solubility and low vapor pressure because of a high level of chlorination (see Appendix H). As a result, the potential for Aroclor-1260 to migrate from the vadose zone into groundwater is relatively low.

Aroclor-1254 has low solubility; however, elevated levels of dissolved organic carbon may increase the aqueous solubility of PCBs. Based on an average TOC content of 2.6 percent in soil from 0 to 10 feet bgs at Redevelopment Block EOS-1, the sorption of PCBs to soil organic matter would be relatively high. Based on the maximum concentration detected during the two most recent quarters of sampling in the RI data set for Redevelopment Block EOS-1, the 2004 plume extent estimated for Aroclor-1254 in groundwater is located less than 100 feet away from the shoreline (see Figure 4-5).

Total Petroleum Hydrocarbons

The detections of TPH that were noted for further evaluation in soil are associated with TPH-g, TPH-d, TPH-mo range, and TPH-unknown hydrocarbons. Based on an average TOC content of 2.6 percent in soil from 0 to 10 feet bgs at Redevelopment Block EOS-1, the mobility of petroleum hydrocarbons in soil is expected be limited because petroleum hydrocarbons tend to strongly sorb to soil and have low solubilities in water. It is expected that the migration of petroleum hydrocarbons from soil to groundwater and the continued migration with groundwater would be limited.

4.3.10 Redevelopment Block EOS-2

This section summarizes the site characterization of Redevelopment Block EOS-2, including the site history (see Section 4.3.10.1), the geology and hydrogeology (see Section 4.3.10.2), the nature and extent of chemicals in soil (see Section 4.3.10.3), the nature and extent of chemicals in groundwater (see Section 4.3.10.4), and the fate and transport of chemicals in soil and groundwater (see Section 4.3.10.5). The planned reuse for this block is open space. No tenants are currently present on this redevelopment block.

4.3.10.1 Site History

Redevelopment Block EOS-2 is located in the southwestern portion of Parcel E. This redevelopment block includes portions of two IR sites: IR-02 Central and IR-03. Site features within Redevelopment Block EOS-2 are shown on Figure 1-13. The subsections below discuss the historical uses of IR-02 Central and IR-03 within the boundaries of Redevelopment Block EOS-2.

4.3.10.1.1 IR-02 Central

The southeastern end of IR-02 Central is within Redevelopment Block EOS-2 (see Figure 4.3.10-1). Portions of IR-02 Central are also located in Redevelopment Blocks 44, EMI-1, EOS-1, and EOS-3. IR-02 Central is described in detail in Section 4.3.9.1.2, Redevelopment Block EOS-1. IR-02 Central, also known as the Bay Fill Area, was used by the Navy to store and dispose of industrial materials and wastes. The southern portion of Triple A Site 17 (former oil reclamation ponds) is located in IR-02 Central; however, the actual oil reclamation ponds are located in IR-03.

4.3.10.1.2 IR-03

IR-03 lies within the boundaries of IR-02 Central and is located in the central portion of Redevelopment Block EOS-2. No buildings are present within IR-03; the area is unpaved and generally unvegetated. IR-03 covers approximately 1.0 acre and includes the former oil reclamation ponds (Triple A Site 17), as described below.

Two oil reclamation ponds were constructed in IR-03 approximately 30 feet from the shoreline within Bay fill. The ponds were used from 1944 to 1974 as part of a waste oil reclamation system. One pond was 50 by 60 feet and 5 feet deep, with a capacity of 190,000 gallons, and the other pond was 55 by 100 feet and 5 feet deep, with a capacity of 250,000 gallons. In 1974, the ponds were emptied and filled with soil. No additional remedial or cleanup action was undertaken at that time (NEESA 1984).

Oily wastes and tainted fuels from ships and shipyard operations at HPS were transported to the ponds by tanker truck or by fuel distribution lines from Berth 29. Oily wastes also were barged to HPS from other installations such as Naval Air Station Alameda and Naval Station Treasure

Island. The waste oils and fuels were heated by subsurface steam pipes to enhance oil water separation. The separated water was discharged to the Bay, and the reclaimed oil was removed from the ponds about three times per year by a contractor who sold it for use as road oil (NEESA 1984).

The volume of waste oil and fuels reclaimed varied from approximately 0.6 to 2 million gallons per year. As much as 30 percent of this volume came from other naval installations. The waste oils and fuels were generated primarily from cleaning ships' fuel tanks and pumping ballast and bilge water during ship repair. Waste oils such as lubrication oil, gear oil, and hydraulic fluid generated at the shipyard were collected and sent to the ponds. The IAS indicated that some of the oily waste contained TCE, caustic soda, ethylene glycol, and chromates; however, the volume of these materials is unknown (NEESA 1984).

Approximately 25 gallons of product floating on the water table was recovered from four monitoring wells during spring 1991. Floating product was recovered using a peristaltic pump on six occasions, and the recovered product was stored at IR-03 in 55-gallon steel drums (HLA 1991a). Additional floating product was recovered every 2 weeks for 6 months during 1991. Approximately 44 additional gallons of floating product was recovered during this period (HLA 1992a).

A removal action began in the winter of 1996 to isolate the groundwater at the former pond areas from the San Francisco Bay. This action involved installing an 800-foot-long sheetpile wall between the former ponds and the shoreline of the Bay. Sheet piles were driven into the ground until they reached the Bay Mud (a maximum depth of 27 feet bgs). The sheetpile wall is designed to key into the Bay Mud and control the movement of groundwater, thus limiting the migration of hazardous substances toward the Bay. Also, a 6-inch clay layer with a 1-foot topsoil layer was placed over the area to minimize rainfall infiltration over the area (PRC 1996h).

4.3.10.2 *Geology and Hydrogeology*

This section briefly discusses the geological and hydrogeological features beneath Redevelopment Block EOS-2. A full description of geology and hydrogeology at Parcel E is presented in Section 3.4 and 3.5, respectively.

Gravel, broken asphalt, and vegetation cover most of Redevelopment Block EOS-2. From the surface downward, the geologic units underlying Redevelopment Block EOS-2 include Artificial Fill, Undifferentiated Upper Sand Deposits, Bay Mud Deposits, Undifferentiated Sedimentary Deposits, and Franciscan Complex bedrock.

Beneath Redevelopment Block EOS-2, Artificial Fill ranges from approximately 8 to 58 feet thick, increasing in thickness from southeast to northwest. Undifferentiated Upper Sands range from 1 to 12 feet thick and lie beneath the Artificial Fill. The Undifferentiated Upper Sands are relatively thin in the southeastern portion of Redevelopment Block EOS-2 and appear to be absent in the central and northeastern portions of the redevelopment block. Bay Mud deposits lie

below the Artificial Fill and Undifferentiated Upper Sand Deposits and are approximately 5 to 55 feet thick, with a marked depression in the northwest portion of the redevelopment block. Undifferentiated Sedimentary Deposits consist of poorly graded sand. Only one boring penetrated the total thickness (94 feet) of the Undifferentiated Sedimentary Deposits. The thickness appears to increase toward the central and northwestern portions of the redevelopment block, and decreases in the southeast portion (see cross section G-G' on Figure 3-6). Bedrock was only encountered in one boring, at a depth of approximately 157 feet bgs. The bedrock surface at Redevelopment Block EOS-2, which is estimated to range from approximately 75 to more than 150 below msl, dips from the northeast to the southwest toward the Bay.

The hydrostratigraphy beneath Redevelopment Block EOS-2 consists of an A-aquifer, an aquitard, and a B-aquifer. Based on average groundwater elevations measured in A-aquifer wells, the depth to groundwater ranges from 7.2 to 11.3 feet bgs throughout Redevelopment Block EOS-2. Groundwater flow in the A-aquifer at Redevelopment Block EOS-2 is generally to the north and is influenced by the sheetpile wall, which was installed to control groundwater flow to the Bay. The B-aquifer is separated from the A-aquifer by the Bay Mud aquitard. Beneath Redevelopment Block EOS-2, the A- and B-aquifers are not in direct hydraulic communication. The general direction of groundwater flow for the B-aquifer is approximately southeast (see Figures 3-11 and 3-12).

In IR-03, an 800-foot-long sheetpile wall was installed between the former oil waste ponds and the shoreline of the Bay in 1996. Sheet piles were driven into the ground until they reached the Bay Mud (a maximum depth of 27 feet bgs). The sheetpile wall is designed to key into the Bay Mud and control the movement of groundwater, thus limiting the migration of hazardous substances on the land side of the sheet pile wall toward the Bay.

4.3.10.3 Nature and Extent of Chemicals in Soil

This section summarizes the evaluation of the nature and extent of chemicals in soil within the boundary of Redevelopment Block EOS-2. The evaluation follows the approach for identifying chemicals and their spatial extent described in Section 4.1.

4.3.10.3.1 Identification and Spatial Distribution of Chemicals in Soil

This section summarizes the chemicals identified in soil at Redevelopment Block EOS-2. Approximately 165 samples were collected at Redevelopment Block EOS-2. Figure 4.3.10-1 shows the locations where soil samples were collected from Redevelopment Block EOS-2. Soil samples were analyzed for metals (including hexavalent chromium), VOCs, SVOCs, cyanide, pesticides, PCBs, and TPH. Cyanide was not detected above the reporting limits in any of the soil samples; therefore, it is not discussed further in this section.

Tables 4.3.10-1 and 4.3.10-2 present the summary statistics for chemicals that were detected at concentrations exceeding the residential and industrial soil screening criteria. Table 4.3.10-1 presents statistics for 121 surface (0 to 10 feet bgs) soil samples; Table 4.3.10-2 presents

statistics for 44 subsurface (deeper than 10 feet bgs) soil samples. Appendix C includes the complete soil data set used to generate the summary statistics tables for this redevelopment block.

The chemicals detected in soil are described below by analytical group: metals, VOCs, SVOCs, pesticides, PCBs, and TPH.

Metals

The risk due to metals is primarily in the upper 10 feet of soil (see Appendix I); therefore, this discussion focuses on the data for metals in surface soil samples. Twenty-five metals were detected in soil samples collected from the surface to a depth of 10 feet bgs. Of the 25 metals detected, 12 metals had one or more detected concentrations exceeding the residential soil screening criteria; only two metals were detected at concentrations that exceeded industrial soil screening criteria.

The lateral extent of elevated concentrations of metals was evaluated to identify areas within Redevelopment Block EOS-2 where metals exceeded Parcel E industrial screening criteria in soil. Figure 4.3.10-2 shows the sampling locations where concentrations of metals exceeded Parcel E industrial screening criteria and presents the elevated concentrations at each location. Concentrations of metals exceeded screening criteria in most soil sampling locations throughout Redevelopment Block EOS-2.

Redevelopment Block EOS-2 coincides with the former oil reclamation ponds at IR-03. Activities at IR-03 may have resulted in releases of metals.

Volatile Organic Compounds

Fourteen VOCs were detected in samples collected from surface soil (0 to 10 feet bgs); only naphthalene was detected at concentrations exceeding the Parcel E residential screening criteria; no VOCs were detected at concentrations that exceeded industrial soil screening criteria (see Figure 4.3.10-3 and Table 4.3.10-1). Nineteen VOCs were detected in samples collected from subsurface soil (deeper than 10 feet bgs); however, only three VOCs exceeded the Parcel E residential screening criteria and no VOCs exceeded industrial screening criteria (see Table 4.3.10-2). As a result, the nature and extent of VOCs in soil at Redevelopment Block EOS-2 is not discussed further in this section.

Semivolatile Organic Compounds

Thirty-seven SVOCs were detected in one or more samples collected from surface soil (0 to 10 feet bgs). However, only 10 SVOCs were detected at concentrations exceeding Parcel E residential screening criteria, 8 of which also exceeded the Parcel E industrial screening criteria (see Table 4.3.10-1). Twenty SVOCs were detected in one or more samples collected from

subsurface soil (deeper than 10 feet bgs); however, only 5 SVOCs were detected at concentrations exceeding Parcel E residential screening criteria.

The lateral extent of elevated concentrations of SVOCs was evaluated to identify areas within Redevelopment Block EOS-2 where SVOCs exceeded Parcel E industrial screening criteria in soil. Figure 4.3.10-4 shows the sampling locations where concentrations of SVOCs exceeded Parcel E industrial screening criteria and presents the elevated concentrations at each location. Concentrations of SVOCs that exceeded screening criteria in soil sampling locations in the central portion of Redevelopment Block EOS-2 are dispersed throughout the redevelopment block and their spatial distribution does not indicate a localized source area.

Redevelopment Block EOS-2 coincides with the former oil reclamation ponds at IR-03. Activities at IR-03 may have resulted in releases of SVOCs.

Pesticides

Thirty-seven pesticides were detected in samples collected from surface soil (0 to 10 feet bgs); however, only 3 pesticides exceeded the Parcel E residential screening criteria (in only one sample); and no pesticides exceeded industrial screening criteria. No pesticides were detected in samples collected from subsurface soil (deeper than 10 feet bgs). As a result, the nature and extent of pesticides in soil at Redevelopment Block EOS-2 is not discussed further in this section.

Polychlorinated Biphenyls

Two PCBs were detected at concentrations that exceeded industrial soil screening criteria collected from surface (0 to 10 feet bgs) and one PCB was detected in samples collected from subsurface (deeper than 10 feet bgs) soil (see Tables 4.3.10-1 and 4.3.10-2).

The lateral extent of elevated concentrations of PCBs was evaluated to identify areas within Redevelopment Block EOS-2 where PCBs exceeded Parcel E industrial screening criteria in soil. Figure 4.3.10-5 shows the sampling locations where concentrations of PCBs exceeded Parcel E industrial screening criteria. Figure 4.3.10-5 also presents the elevated concentrations at each location. The highest concentration of Aroclor-1260 was found at sample point IR03B372 adjacent to the north of the IR-03 footprint, where it measured 280 mg/kg at a depth of 14 to 15 feet and associated with a TTPH value of 8,860 mg/kg, indicating that the IR-03 oily waste ponds may have been the source. Because of the elevated concentrations and the location adjacent to IR-03, remedy for this location will be evaluated in the FS as part of IR-03 oily waste ponds. The viable soil exposure pathway in the open space reuse areas is limited to 0 to 3 feet, and based on Figure 4-5, no PCB groundwater plume is identified in Redevelopment Block EOS-2.

Concentrations of PCBs exceeded screening criteria in contiguous soil sampling locations dispersed throughout Redevelopment Block EOS-2.

Redevelopment Block EOS-2 coincides with the former oil reclamation ponds at IR-03. Activities at IR-03 may have resulted in releases of PCBs.

Total Petroleum Hydrocarbons

TPH concentrations exceeded the soil source screening criterion at 11 sampling locations; all of the locations were collocated with CERCLA chemicals. Free product was detected in monitoring wells within this redevelopment block (Tetra Tech 2002c).

The lateral extent of elevated concentrations of TTPH was evaluated to identify areas within Redevelopment Block EOS-2 where TTPH exceeded the soil source screening criterion in soil. Figure 4.3.10-5 shows the sampling locations where concentrations of TTPH exceeded the soil source screening criterion and presents the elevated concentrations at each location. Concentrations of TTPH exceeded the soil source screening criterion in soil sampling locations dispersed throughout Redevelopment Block EOS-2. The area with elevated concentrations of TTPH is collocated with areas with elevated concentrations of metals, SVOCs, and PCBs.

Redevelopment Block EOS-2 coincides with the former oil reclamation ponds at IR-03. Activities at IR-03 may have resulted in releases of TPH.

4.3.10.3.2 Extent of Chemicals in Soil

The screening process identified concentrations of chemicals throughout Redevelopment Block EOS-2 that exceeded Parcel E screening criteria, including metals, SVOCs, and PCBs and TTPH (see Figures 4.3.10-2, 4.3.10-4, and 4.3.10-5).

Redevelopment Block EOS-2 coincides with the former oil reclamation ponds at IR-03. Activities at IR-03 may have resulted in releases of metals, PAHs, PCBs, and TPH. The estimated size of the area is 400 feet (northeast-southwest) by 800 feet (northwest-southeast). The depth to groundwater is 8.7 feet bgs.

4.3.10.4 Nature and Extent of Chemicals in Groundwater

This section summarizes the evaluation of the nature and extent of chemicals detected in groundwater samples collected from monitoring wells associated with Redevelopment Block EOS-2. Figure 4.3.10-6 shows the locations of the groundwater monitoring wells associated with Redevelopment Block EOS-2. In IR-03, an 800-foot-long sheetpile wall was installed between the former oil waste ponds and the shoreline of the Bay in 1996. Sheet piles were driven into the ground until they reached the Bay Mud (a maximum depth of 27 feet bgs). The sheetpile wall is designed to key into the Bay Mud and control the movement of groundwater, thus limiting the migration of hazardous substances on the land side of the sheet pile wall toward the Bay.

Tables 4.3.10-3 and 4.3.10-4 present the summary statistics for chemicals that were detected in the A-aquifer and the B-aquifer, respectively. No bedrock water-bearing zone wells are associated with Redevelopment Block EOS-2. Table 4.3.10-3 presents statistics for data from 14 A-aquifer wells; Table 4.3.10-4 presents statistics for data from 2 B-aquifer wells. Chemicals that were retained for evaluation based on consideration of the factors described in Section 4.1.2.2 are shaded and shown in bold font in these tables. Appendix D includes the complete groundwater data set for this redevelopment block.

4.3.10.4.1 Chemicals in A-Aquifer Groundwater

Fourteen A-aquifer wells are associated with Redevelopment Block EOS-2 (see Figure 4.3.10-6), including 1 well located just outside the north-central border of Redevelopment Block EOS-2. Groundwater samples collected from the A-aquifer wells were analyzed for metals (including hexavalent chromium), VOCs, SVOCs, cyanide, pesticides, PCBs, and TPH. Some of the A-aquifer wells at Redevelopment Block EOS-2 were not sampled because of the presence of the floating product (or light nonaqueous-phase liquids [LNAPL]). Cyanide was not detected in any groundwater samples collected from A-aquifer wells associated with Redevelopment Block EOS-2; therefore, this chemical is not discussed further in this section.

The chemicals that were detected in groundwater samples collected from the A-aquifer are evaluated below by the following analytical groups: metals, VOCs, SVOCs, pesticides, PCBs, and TPH. Evaluation of LNAPL is presented at the end of this section.

Metals

Samples collected from the A-aquifer wells associated with Redevelopment Block EOS-2 were analyzed for metals during one or more rounds of sampling; 25 metals were detected. Of the 25 metals detected, 7 metals (arsenic, chromium, copper, lead, mercury, nickel, and zinc) exceeded the appropriate screening criterion (surface water criteria, or HGALs if greater than surface water criteria) listed in Table 4.3.10-3. The spatial and temporal distribution of these seven metals in groundwater is discussed below.

- Arsenic exceeded its surface water criterion (36 µg/L) and its HGAL (27.34 µg/L) in 6 of 57 groundwater samples. The six exceedances were detected in samples collected from well IR03MWO-1 in 1992 and well IR02MW173A in 1992 and 1996, with concentrations ranging from 49.6 to 1,180 µg/L. These wells are located approximately 100 feet from the Bay. The table on the following page summarizes the analytical results for arsenic for these two wells, with the surface water criteria exceedances highlighted in bold.

Sampling Location	Sample Date	Arsenic (µg/L)	Qualifier
IR02MW173A	01-29-1992	49.6	
	01-29-1992	54.6	
	03-26-1996	75.7	
	05-30-1996	73.7	
IR03MWO-1	01-23-1992	182	J
	01-23-1992	138	J
	07-09-1992	1180	J
	08-28-1992	367	J

No subsequent groundwater samples from these two wells have been analyzed for arsenic. The source of arsenic in A-aquifer groundwater is possibly associated with a combination of (1) waste oil managed in the former oil reclamation ponds, (2) sandblast waste disposed of on the surface at IR-03, (3) sandblast waste used as fill material, and (4) soil containing these metals used as fill material throughout IR-03.

- Chromium exceeded its surface water criterion (50 µg/L) and its HGAL (15.66 µg/L) in 4 of 57 groundwater samples. The four exceedances were detected in samples collected from wells IR03MW224A, IR03MW226A, IR03MW342A, and IR03MWO-1 in July and August 1992, with concentrations ranging from 63.6 to 567 µg/L. Chromium was not detected above 6 µg/L in the last samples collected from well IR03MW224A (from 2001 through 2004). The single exceedance at well IR03MW226A was reported in the duplicate sample in July 1992 (68.6 µg/L), but was not detected in the original sample or in the subsequent sample collected in August 1992. Chromium was detected at concentrations below 9 µg/L in the last samples collected from well IR03MW342A (from 1995 through 2004). The highest chromium concentration (567 µg/L) was detected at well IR03MWO-1 in July 1992. This well is located approximately 180 feet from the Bay. Chromium was not detected above a concentration of 15.5 µg/L in the preceding or subsequent samples collected from well IR03MWO-1 in January and August 1992.
- Copper exceeded its surface water criterion (3.1 µg/L) and its HGAL (28.04 µg/L) in 8 of 58 groundwater samples, with concentrations ranging from 34.5 to 3,240 µg/L. The eight exceedances were detected in samples collected from five wells (IR03MW218A2, IR03MW224A, IR03MW226A, IR03MW342A, and IR03MWO-1). All of the exceedances were detected in July and August 1992 and occurred only once per well, except for the exceedances at well IR03MW342A. This well is located approximately 120 feet from the Bay. The table on the following page summarizes the analytical results for copper for well IR03MW342A, with the HGAL exceedances highlighted in bold.

Sampling Location	Sample Date	Copper (µg/L)	Qualifier
IR03MW342A	07-06-1992	101	J
	08-28-1992	422	
	07-24-1995	0.89	UJ
	03-21-1996	1.8	U
	03-21-1996	1	U
	03-15-2001	4.5	U
	07-25-2002	4	UJ
	09-16-2002	56.2	
	06-16-2004	271	
	09-14-2004	3.6	U
	11-22-2004	5	U

As shown in the table above, copper concentrations have not consistently exceeded the screening criteria, and copper was not detected above 5 µg/L in the last four samples collected from well IR03MW342A.

- Lead exceeded its surface water criterion (5.6 µg/L) and its HGAL (14.44 µg/L) in 6 of 57 groundwater samples, with concentrations ranging from 23.4 to 613 µg/L. The six exceedances were detected in samples collected from five wells (IR03MW218A1, IR03MW218A2, IR03MW226A, IR03MW342A, and IR03MWO-1). All of the exceedances were detected in July and August 1992 and occurred only once, except at well IR03MW342A, where it was detected twice in July 1992. Lead was not detected above 11.3 µg/L in the samples collected from wells IR03MW218A2 and IR03MW342A (from 1995 through 2004). No subsequent samples from well IR03MW218A1 were analyzed for lead, but it was not detected in the previous sample collected in January 1992. Lead was detected in the duplicate sample from well IR03MW226A in July 1992, but was not detected in the original sample or in the subsequent sample collected from this well in August 1992. Lead was detected at a concentration of 65 µg/L at well IR03MWO-1 in July 1992, but was not detected in the subsequent sample collected in August 1992.
- Mercury exceeded its surface water criterion (0.025 µg/L) and its HGAL (0.6 µg/L) in 3 of 56 groundwater samples, with concentrations ranging from 0.8 to 2 µg/L. The three exceedances were detected in samples collected from wells IR03MW226A, IR03MW342A, and IR03MWO-1 in July and August 1992. All three exceedances occurred only once at each well, and mercury was not detected in any of the subsequent samples collected from these wells (from 1992 through 2004).
- Nickel exceeded its surface water criterion (8.2 µg/L) and its HGAL (96.48 µg/L) in 4 of 57 groundwater samples, with concentrations ranging from 146 to 1,140 µg/L. The four exceedances were detected in samples collected from Wells IR03MW226A, IR03MW342A, and IR03MWO-1 in January, July, and August 1992. All four exceedances occurred only once at each well, and nickel was not detected above the screening criteria in any of the one or more subsequent samples collected from each of these wells (from 1992 through 2004).

- Zinc exceeded its surface water criterion (81 µg/L) and its HGAL (75.68 µg/L) in 7 of 57 groundwater samples, with concentrations ranging from 93.3 to 2,400 µg/L. The seven exceedances were detected in samples collected from four wells (IR03MW218A2, IR03MW226A, IR03MW342A, and IR03MWO-1). All of the exceedances were detected in 1992, except for well IR03MW218A2. Zinc was not detected above screening criteria in subsequent samples collected from wells IR03MW226A, IR03MW342A, and IR03MWO-1. Zinc concentrations at IR03MW218A2 exceeded the surface water criterion in July 1992 (94.5 µg/L) and March 2001 (120 µg/L), but was not detected in the subsequent five samples (from 2002 through 2004). This well is located approximately 80 feet from the Bay.

Arsenic in A-aquifer groundwater at Redevelopment Block EOS-2 is discussed further in Section 4.3.10.5.

Volatile Organic Compounds

Samples collected from the A-aquifer wells associated with Redevelopment Block EOS-2 were analyzed for VOCs during one or more rounds of sampling; 26 VOCs were detected. Of the 26 VOCs detected, 8 VOCs (1,2-DCA, 1,4-DCB, benzene, chlorobenzene, naphthalene, PCE, TCE, and vinyl chloride) exceeded at least one of the appropriate screening criteria (vapor intrusion and surface water criteria) listed in Table 4.3.10-3. The spatial and temporal distribution of these eight VOCs is discussed below.

- 1,2-DCA exceeded its vapor intrusion criterion (2.3 µg/L) in 2 of 62 groundwater samples. The two exceedances (both 3 µg/L) were detected in samples collected from wells IR03MW225A and IR03MW226A in January and July 1992, respectively. 1,2-DCA also was detected in the duplicated sample from IR03MW225A in January 1992. All three exceedances were qualified as estimated because they were below the PQL, and 1,2-DCA was not detected in the subsequent two samples collected from each well in 1992 and 1996.
- 1,4-DCB exceeded its vapor intrusion criterion (2.1 µg/L) in 7 of 61 groundwater samples, with concentrations ranging from 3 to 84 µg/L. The seven exceedances were detected in samples collected from wells IR03MW218A1 and IR03MWO-1 in 1992, and well IR03MW225A in 1992 and 1996. The single detection at well IR03MW218A1 (in July 1992) was qualified as estimated and 1,4-DCB was not detected in the only other sample collected from this well in January 1992. 1,4-DCB was detected in six samples collected from wells IR03MWO-1 and IR03MW225A. The table on the following page summarizes the analytical results for 1,4-DCB for these two A-aquifer wells, with the vapor intrusion criterion exceedances highlighted in bold.

Sampling Location	Sample Date	1,4-DCB (µg/L)
IR03MWO-1	01-23-1992	57
	01-23-1992	49
	07-09-1992	66
	08-28-1992	84
IR03MW225A	01-28-1992	17
	01-28-1992	16
	04-03-1996	8
	06-19-1996	10

Both of these wells are located in the central portion of Redevelopment Block EOS-2 at IR-03. No samples were collected from wells IR03MWO-1 and IR03MW225A after 1992 and 1996, respectively. The source of 1,4-DCB in groundwater is probably from waste fuels and waste oils managed in the former oil reclamation ponds at IR-03.

- Benzene exceeded its vapor intrusion criterion (0.37 µg/L) in 43 of 62 groundwater samples, with concentrations ranging from 0.5 to 13 µg/L. The 43 exceedances were detected in samples collected from all 12 of the 14 A-aquifer wells (not detected in wells IR03MW371A and IR03MW372A). The highest benzene concentrations have been detected in samples collected from wells IR03MW218A2 and IR03MWO-1, located in the central portion of Redevelopment Block EOS-2. The table below summarizes the analytical results for benzene for these two A-aquifer wells, with the vapor intrusion criterion exceedances highlighted in bold.

Sampling Location	Sample Date	Benzene (µg/L)	Qualifier
IR03MW218A2	01-15-1992	13	
	07-09-1992	10	
	08-27-1992	10	
	03-14-2001	11	
	07-30-2002	8.8	
	09-23-2002	13	
	06-15-2004	7	
	09-14-2004	7.7	J
	11-23-2004	5.2	
IR-03MWO-1	01-23-1992	6	J
	01-23-1992	5	J
	07-09-1992	9	
	08-28-1992	9	

The 2004 benzene groundwater plume in Redevelopment Block EOS-2, shown on Figure 4-4, was defined by the extent of benzene based on the 2004 quarterly groundwater monitoring data (see Table 4-4). The 2004 analytical results indicated that the plume was generally centered on IR-03 and encompassed most of Redevelopment Block EOS-2. The source of benzene in groundwater is probably from waste fuels managed in the former oil reclamation ponds at IR-03.

- Chlorobenzene exceeded its surface water criterion (129 µg/L) in only 1 of 61 groundwater samples. The single exceedance (130 µg/L in the original sample and 150 µg/L in the duplicate sample) was detected at well IR03MW225A in January 1992. Chlorobenzene was detected at concentrations of 51 and 75 µg/L in the two subsequent samples collected from this well in April and June 1996, respectively.
- Naphthalene exceeded its vapor intrusion criterion (3.6 µg/L) in 29 of 56 groundwater samples. The 29 exceedances were detected in samples collected from 12 of the 14 A-aquifer wells (not detected in wells IR03MW371A and IR03MW372A). The highest naphthalene concentrations have been detected in samples collected from wells IR02MW146A, IR02MW173A, and IR03MW218A2, located northwest of, east of, and in IR-03, respectively. The table below summarizes the analytical results for naphthalene for these three A-aquifer wells, with the vapor intrusion criterion exceedances highlighted in bold.

Sampling Location	Sample Date	Naphthalene (µg/L)	Qualifier
IR02MW146A	01-30-1992	40	
	01-30-1992	33	
	03-26-1996	12	
	05-29-1996	18	J
	05-29-1996	16	J
IR02MW173A	01-29-1992	52	J
	01-29-1992	47	J
	03-26-1996	31	
	05-30-1996	16	J
IR03MW218A2	01-15-1992	53	
	07-09-1992	7	J
	08-27-1992	45	
	07-30-2002	54	
	09-23-2002	64	
	06-15-2004	38	
	09-14-2004	50	U
	11-23-2004	24	

After 1996, samples from only three A-aquifer wells (IR03MW218A2, IR03MW224A, and IR03MW342A) were analyzed for naphthalene. Of these three wells, naphthalene was only detected in samples from IR03MW218A2 after 1996. However, based on the previous analytical results the 2004 naphthalene plume is estimated to be centered around IR-03 and extend throughout most of Redevelopment Block EOS-2. The source of naphthalene in groundwater is probably from waste fuels managed in the former oil reclamation ponds at IR-03.

- PCE exceeded its vapor intrusion criterion (0.54 µg/L) in only 1 of 61 groundwater samples. The single exceedance (1 µg/L) was detected in a sample collected from well IR03MWO-1 in July 1992 and was qualified as estimated because it was below the detection limit. PCE was not detected in the preceding sample (January 1992) and the only subsequent sample (August 1992) collected from this well.

- TCE exceeded its vapor intrusion criterion (2.9 µg/L) in only 1 of 62 groundwater samples. The single exceedance (15 µg/L) was detected in a sample collected from well IR03MWO-1 in July 1992. TCE was not detected in the preceding sample (January 1992) and the only subsequent sample (August 1992) collected from this well.
- Vinyl chloride exceeded its vapor intrusion criterion (0.028 µg/L) in 3 of 62 groundwater samples, with concentrations ranging from 0.49 to 2 µg/L. The three exceedances were detected in samples collected from well IR03MW342A in July 2002 and well IR03MW218A2 in 2001 and 2002. Vinyl chloride was not detected in the subsequent samples collected from well IR03MW342A (from 2002 through 2004). The table below summarizes the analytical results for vinyl chloride for well IR03MW218A2, with the vapor intrusion criterion exceedances highlighted in bold.

Sampling Location	Sample Date	Vinyl Chloride (µg/L)	Qualifier
IR03MW218A2	01-15-1992	10	U
	07-09-1992	10	U
	08-27-1992	10	U
	03-14-2001	2	
	07-30-2002	0.5	U
	09-23-2002	1.3	
	06-15-2004	0.5	U
	09-14-2004	0.5	U
	11-23-2004	0.5	U

All of the vinyl chloride detections at well IR03MW218A2 have been near the detection limits, which were above the vapor intrusion screening criterion. The source of vinyl chloride in groundwater is probably from waste oils managed in the former oil reclamation ponds (IR-03).

1,4-DCB, benzene, naphthalene, and vinyl chloride in A-aquifer groundwater at Redevelopment Block EOS-2 are discussed further in Section 4.3.10.5.

Semivolatile Organic Compounds

Samples collected from the A-aquifer wells associated with Redevelopment Block EOS-2 were analyzed for SVOCs during one or more rounds of sampling; 25 SVOCs were detected. Of the 25 SVOCs detected, only 1 SVOC (phenanthrene) exceeded at least one of the appropriate screening criteria (vapor intrusion and surface water criteria) listed in Table 4.3.10-3. The spatial and temporal distribution of this SVOC is discussed below.

Phenanthrene exceeded its surface water criterion (60 µg/L) in only 1 of 59 groundwater samples. The single exceedance (69 µg/L) was detected in a sample collected from well IR03MWO-1 in January 1992. Phenanthrene was detected at a concentration of 12 µg/L in the

subsequent sample collected from this well in July 1992, and was not detected in the most recent sample in the RI data set collected in August 1992. As a result, SVOCs in A-aquifer groundwater at Redevelopment Block EOS-2 are not discussed further in this section.

Pesticides

Samples collected from the A-aquifer wells associated with Redevelopment Block EOS-2 were analyzed for pesticides during one or more rounds of sampling; nine pesticides were detected. Of the nine pesticides detected, only one pesticide (heptachlor epoxide) exceeded at least one of the appropriate screening criteria (vapor intrusion and surface water criteria) listed in Table 4.3.10-3.

Heptachlor epoxide exceeded its surface water criterion (0.0036 µg/L) in only 1 of 42 groundwater samples. The single exceedance (0.01 µg/L) was detected in a sample collected from well IR03MW370A in March 1996. Heptachlor epoxide was not detected in the previous (November 1995) or subsequent (May 1996) samples collected from this well. As a result, pesticides in A-aquifer groundwater at Redevelopment Block EOS-2 are not discussed further in this section.

Polychlorinated Biphenyls

Samples collected from the A-aquifer wells associated with Redevelopment Block EOS-2 were analyzed for PCBs during one or more rounds of sampling; two PCBs were detected. Both PCBs (Aroclor-1254 and Aroclor-1260) were detected at concentrations exceeding the surface water criterion (0.03 µg/L), which is less than the reported detection limits (ranging from 0.1 to 10 µg/L). The spatial and temporal distribution of these two PCBs is discussed below.

- Aroclor-1254 was detected in 2 of 53 samples collected from well IR02MW146A in May 1996 (0.2 µg/L) and well IR03MW225A in June 1996 (1 µg/L). The single detection at well IR02MW146A was in a duplicate sample and qualified as estimated because it was below the PQL; this PCB was not detected in the original sample. The detection at well IR03MW225A was within one order of magnitude of the screening criteria and near the detection limit, and Aroclor-1254 was not detected in either of the preceding two samples collected from this well in January 1992 and April 1996.
- Aroclor-1260 was detected in 15 of 53 samples collected from seven wells (IR02MW146A, IR03MW218A1, IR03MW224A, IR03MW225A, IR03MW226A, IR03MW371A, and IR03MWO-1). The seven exceedances of Aroclor-1260 detected in these wells ranged from 0.06 to 290 µg/L, with about half being qualified as estimated because the concentrations were detected below the PQL. Aroclor-1260 was not detected in any of the samples collected from wells IR02MW146A, IR03MW224A, IR03MW371A, and IR03MWO-1 subsequent to their last detection. No samples from wells IR03MW218A1, IR03MW225A, or IR03MW226A were analyzed for Aroclor-1260 subsequent to their last detections.

The table below summarizes the analytical results for Aroclor-1260 for these three wells, with the surface water criterion exceedances highlighted in bold.

Sampling Location	Sample Date	Aroclor-1260 (µg/L)	Qualifier
IR03MW218A1	01-24-1992	10	U
	01-24-1992	10	U
	07-09-1992	32	J
IR03MW225A	01-28-1992	3	
	01-28-1992	4	J
	04-03-1996	0.5	U
	06-19-1996	2	
IR03MW226A	01-27-1992	2	U
	01-27-1992	2	U
	07-24-1992	9	J
	07-24-1992	12	J
	08-27-1992	9	

The most recent detections of Aroclor-1260 in the RI data set at wells IR03MW218A1 and IR03MW226A have exceeded the surface water criterion by over two orders of magnitude. These wells are located approximately 80 feet from the Bay. The source of Aroclor-1260 in groundwater is probably from waste oils managed in the former oil reclamation ponds at IR-03.

Aroclor-1260 in A-aquifer groundwater at Redevelopment Block EOS-2 is discussed further in Section 4.3.10.5.

Total Petroleum Hydrocarbons

Samples collected from the A-aquifer wells associated with Redevelopment Block EOS-2 were analyzed for TPH products during one or more rounds of sampling. TPH-d and TPH-g were detected in all 14 A-aquifer wells, and TPH-mo was detected in 10 A-aquifer wells. The maximum concentrations detected of each TPH range varied from 2,000 to 16,000 µg/L (see Table 4.3.10-3). These maximum concentrations were all above the TPH screening criteria for groundwater. The highest TPH concentrations have been detected in wells IR03MW370A and IR03MW225A. Samples collected from both of these wells have exhibited TPH-d concentrations exceeding 10,000 µg/L.

The 2004 TPH groundwater plume in Redevelopment Block EOS-2, as shown on Figure 4-6, was defined by the extent of TTPH based on the 2004 quarterly groundwater monitoring data (see Table 4-6) and also using information from wells with detections of LNAPL. The 2004 TPH plume surrounds the IR-03 area. The source of TPH in groundwater is probably from waste fuels managed in the former oil reclamation ponds at IR-03.

Nonaqueous-Phase Liquids

LNAPL currently exists at Redevelopment Block EOS-2 at the former oil reclamation ponds area (IR-03). Figure 4-6 shows wells in which LNAPL was detected and the table below summarizes the floating product measurements collected in 2002 in Phase III GDGI (Tetra Tech 2004c).

Monitoring Well	LNAPL Thickness (feet)	Date of Measurement
IR03MWO-1	< 0.01	8/1/02
IR03MWO-1	0.18	9/17/02
IR03MW146A	2.7	8/1/02
IR03MW146A	2.99	9/19/02
IR03MW173A	0.7	8/1/02
IR03MW173A	3.03	9/19/02
IR03MW218A1	0.01	7/31/02
IR03MW225A	3.97	8/1/02
IR03MW225A	4.91	9/19/02
IR03MW226A	0.9	8/1/02
IR03MW226A	0.25	9/17/02
IR03MW369A	0.8	7/31/02
IR03MW369A	0.01	7/31/02
IR03MW369A	4.58	9/17/02
IR03MW370A	8.9	8/1/02
IR03MW370A	10.85	9/19/02
IR03MW371A	< 0.01	7/31/02
IR03MW371A	< 0.01	9/17/02

LNAPL was described as (1) highly viscous; (2) consisting of 2:1 diesel to motor oil; and (3) with thickness ranging from a slight sheen to 10.85 feet (this is the apparent thickness measured in the well; actual thickness in the aquifer is usually less than the apparent thickness) (Tetra Tech 2004c). LNAPL data collected at Parcel E as part of the ongoing groundwater monitoring program at HPS subsequent to December 2004 will be evaluated further in the FS.

4.3.10.4.2 Chemicals in B-Aquifer Groundwater

Two B-aquifer wells (IR03MW228B and IR03MW373B) are associated with Redevelopment Block EOS-2 (see Figure 4.3.10-6). Well IR03MW373B is located just outside the north-central boundary of Redevelopment Block EOS-2. Groundwater samples collected from the B-aquifer wells were analyzed for metals (including hexavalent chromium), VOCs, SVOCs, pesticides, PCBs, and TPH. SVOCs, pesticides, and PCBs were not detected in any groundwater samples collected from the B-aquifer wells associated with Redevelopment Block EOS-2; therefore, these chemicals are not discussed further in this section. Table 4.3.10-4 presents the summary statistics for chemicals detected in samples collected from the B-aquifer wells.

The chemicals that were detected in groundwater samples collected from the B-aquifer are evaluated below by the following analytical groups: metals, VOCs, and TPH.

Metals

Samples collected from the B-aquifer wells associated with Redevelopment Block EOS-2 were analyzed for metals during one or more rounds of sampling; 16 metals were detected. Of the 16 metals detected, 3 metals (arsenic, cadmium, and copper) exhibited concentrations exceeding one or more screening criteria (domestic use criteria, surface water criteria, and MCLs) listed in Table 4.3.10-4. The spatial and temporal distribution of these three metals is discussed below.

- Arsenic exceeded its domestic use criterion (0.007 µg/L) in five of eight groundwater samples. The five exceedances were detected in samples collected from well IR03MW373B in November 2004 and well IR03MW228B in 1991, 1992, and 2002. The table below summarizes the analytical results for arsenic for these two wells, with the domestic use criterion exceedances highlighted in bold.

Sampling Location	Sample Date	Arsenic (µg/L)	Qualifier
IR03MW228B	05-06-1991	3.6	
	05-06-1991	3.9	
	01-16-1992	5.2	
	08-28-1992	4.7	
	08-02-2002	3.4	U
	08-02-2002	3.9	U
	09-12-2002	4.1	J
IR03MW373B	06-15-2004	5	U
	09-14-2004	5	U
	11-19-2004	6.2	

All of the arsenic detections exceeded the domestic use criteria by over two orders of magnitude. Although HGALs were derived for the A-aquifer, arsenic concentrations in the B-aquifer are below the HGAL and therefore are believed to be ubiquitous.

- Cadmium exceeded its MCL (5 µg/L) in one of eight groundwater samples. The single exceedance (5.6 µg/L) was detected in a sample collected from well IR03MW228B in August 1992. This well is located approximately 90 feet from the Bay. Cadmium was not detected in the two subsequent samples collected from this well in August and September 2002.
- Copper exceeded its surface water criterion (3.1 µg/L) in two of eight groundwater samples. The two exceedances were detected in samples collected from well IR03MW228B in January and August 1992, with concentrations of 5.2 and 6.4 µg/L, respectively. This well is located approximately 90 feet from the Bay. Copper was not detected in the two subsequent samples collected from this well in August and September 2002.

Metals in B-aquifer groundwater at Redevelopment Block EOS-2 are not discussed further in this section.

Volatile Organic Compounds

Samples collected from the B-aquifer wells associated with Redevelopment Block EOS-2 were analyzed for VOCs during one or more rounds of sampling; five VOCs were detected. Of the five VOCs detected, two VOCs (PCE and TCE) exhibited concentrations exceeding one or more of the screening criteria (domestic use criteria, surface water criteria, and MCLs) listed in Table 4.3.10-4. The spatial and temporal distribution of these two VOCs are discussed below.

- PCE exceeded its domestic use criterion (0.1 µg/L) in only 1 of 11 samples. The single exceedance (0.16 µg/L) was detected in a sample collected from well IR03MW228B in November 2004, and was qualified as estimated because it was below the PQL.
- TCE exceeded its domestic use criterion (1.4 µg/L) in only 1 of 11 samples. The single exceedance (34 µg/L) was detected in a sample collected from well IR03MW228B in August 1992. TCE was not detected in the most recent samples in the RI data set collected from this well in 2004.

As a result, VOCs in B-aquifer groundwater at Redevelopment Block EOS-2 are not discussed further in this section.

Total Petroleum Hydrocarbons

Samples collected from the B-aquifer wells associated with Redevelopment Block EOS-2 were analyzed for TPH products during one or more rounds of sampling. Only TPH-e were detected in one groundwater sample from one B-aquifer well (IR03MW228B). The single TPH detection (51 µg/L at well IR03MW228B in January 1992) was less than TPH screening criteria for groundwater (see Section 4.1). As a result, TPH in B-aquifer groundwater at Redevelopment Block EOS-2 are not discussed further in this section.

4.3.10.4.3 Extent of Chemicals in Groundwater

The screening process identified one area within Redevelopment Block EOS-2 where concentrations of chemicals in A-aquifer groundwater consistently exceeded Parcel E screening criteria. Chemicals detected in groundwater within this area included arsenic, 1,4-DCB, benzene, naphthalene, vinyl chloride, Aroclor-1260, and TPH (see Figures 4-3, 4-4, and 4-6 and Tables 4-2, 4-3, and 4-5). The source of these chemicals in A-aquifer groundwater is likely related to waste fuels and waste oil managed in the former oil reclamation ponds at IR-03.

4.3.10.5 Evaluation of Chemical Fate and Transport

As described in Sections 4.3.10.3 and 4.3.10.4, soil sampling results exceeded Parcel E soil screening criteria throughout Redevelopment Block EOS-2 and 11 wells were identified where groundwater sampling results exceeded Parcel E groundwater screening criteria in Redevelopment Block EOS-2. Chemicals identified in areas exceeding Parcel E screening criteria in soil are metals (arsenic and lead); SVOCs; PCBs; and TPH. Arsenic; benzene, naphthalene; PCBs; and TPH also were identified in A-aquifer groundwater as exceeding Parcel E screening criteria. The persistence and mobility of these chemicals in soil and groundwater is discussed below.

Metals

Arsenic

Arsenic was detected at concentrations exceeding Parcel E screening criteria in soil and groundwater, suggesting leaching at Redevelopment Block EOS-2. Arsenic was detected during the last sampling events that included analysis for metals conducted in 1996 and 1992 at concentrations exceeding screening criteria in samples from Wells IR02MW173A and IR03MWO-1. Arsenic has a tendency to sorb to soils and sediments. In aerobic fresh waters, coprecipitation and sorption of arsenic and arsenic compounds with hydrous oxides of iron and phosphate are the dominant processes in removing dissolved arsenic (see Appendix H). Arsenic is not expected to be mobile in groundwater at Redevelopment Block EOS-2 because of the oxidizing conditions present in groundwater near the shoreline. It is expected that migration of arsenic from soil to groundwater and continued migration with groundwater would be limited.

Lead

The mobility of lead is highly dependant on soil pH and infiltration of water. Soil pH within Redevelopment Block EOS-2 ranges from 6.68 to 9.6 (see Appendix C). Average pH calculated as described in Section 4.3.2.5 is 8.0. Of 50 soil pH measurements, only one was below 7.0. The predominantly above-neutral pH values measured in the vadose zone soil samples indicate that site conditions do not favor leaching of these metals into groundwater (see Appendix H).

Volatile Organic Compounds

1,4-Dichlorobenzene

1,4-DCB was detected in A-aquifer groundwater at concentrations exceeding Parcel E screening criteria (vapor intrusion) at three wells at Redevelopment Block EOS-2 in 1992 and 1996. No subsequent samples were analyzed for these wells after the last detections in 1992 and 1996. 1,4-DCB has tendency to volatilize however it is less volatile than the other VOCs. 1,4-DCB has moderate aqueous solubility, which is countered by the tendency for 1,4-DCB to sorb to soil organic material. The potential for 1,4-DCB to migrate toward the Bay is limited.

Benzene

Benzene was not detected in surface (0 to 10 feet bgs) soil at concentrations exceeding Parcel E screening criteria (vapor intrusion). Benzene was detected in one subsurface (deeper than 10 feet bgs) sample at a concentration of 0.19 mg/kg. Benzene also was detected in A-aquifer groundwater at concentrations exceeding Parcel E screening criteria (vapor intrusion) at 11 of 14 groundwater wells at Redevelopment Block EOS-2. The estimated 2004 benzene plume at Redevelopment Block EOS-2 underlies a large portion of this redevelopment block and appears to extend to the shoreline (see Figure 4-4), suggesting the possibility of physical mixing of groundwater with the Bay waters.

Naphthalene

Naphthalene was detected in surface (0 to 10 feet bgs) and subsurface (deeper than 10 feet bgs) soil at concentrations exceeding Parcel E screening criteria. Naphthalene also was detected at concentrations exceeding Parcel E screening criteria (vapor intrusion) in A-aquifer groundwater at eight wells at Redevelopment Block EOS-2. Naphthalene strongly sorbs to organic carbon in soil and has low solubility in water and relatively low vapor pressure. The potential for additional leaching of naphthalene from soil into groundwater and for naphthalene in groundwater to migrate toward the Bay is limited. However, the wells with concentrations exceeding Parcel screening criteria at Redevelopment Block EOS-2 are located near to the Bay (nearest well is about 45 feet from the Bay), suggesting the possibility of groundwater mixing with Bay water in the tidal mixing zone.

Vinyl Chloride

Vinyl chloride was detected at concentrations exceeding Parcel E screening criteria at two wells (IR03MW342A and IR03MW218A2) in A-aquifer groundwater at Redevelopment Block EOS-2. Vinyl chloride was detected only once at Well IR03MW342A in 2002 and was not detected in six subsequent samples from this well. Vinyl chloride concentrations also were detected exceeding Parcel E screening criteria at Well IR03MW218A2 in 2001 and 2002 and was not detected in two subsequent samples from this well.

Vinyl chloride is highly soluble and has a relatively high vapor pressure. Volatilization is an effective transport mechanism for vinyl chloride. Well IR03MW218A2 is located approximately 80 feet from the shoreline. The potential for elevated vinyl chloride concentrations to migrate toward Bay is limited.

Semivolatile Organic Compounds

Ten SVOCs were detected in soil at concentrations exceeding Parcel E screening criteria. Benzo(a)pyrene and benzo(b)fluoranthene were selected as the representative SVOCs for evaluation of the fate and transport of SVOCs in soil. No SVOCs exceeded screening criteria in groundwater. The mobility of these SVOCs in soil is expected to be limited because these

chemicals have (1) a very low solubility in water, (2) a low vapor pressure, and (3) a tendency to strongly sorb to organic carbon in soil. The potential for these chemicals to migrate from the vadose zone into groundwater is relatively low.

Polychlorinated Biphenyls

Aroclor-1260 was detected in soils and groundwater (seven wells) at concentrations exceeding Parcel E screening criteria. Aroclor-1260 has very low solubility and low vapor pressure because of a high level of chlorination (see Appendix H). Aroclor-1260 groundwater exceedances were detected in 1992, predating the use of field filtering and low-flow sampling techniques, and therefore may reflect total PCB concentration (including PCBs sorbed to colloidal particles) rather than dissolved PCBs actually in groundwater. Aroclor-1260 was not detected in subsequent sample collected from four of the wells and not analyzed in the other three wells. Although co-existence with petroleum hydrocarbons (as are present at Redevelopment Block EOS-2) may increase solubility and mobility of PCBs, it is expected that the further migration of Aroclor-1260 from soil to groundwater and continued migration with groundwater would be limited. The wells with maximum Aroclor-1260 concentrations exceeding Parcel E screening criteria at Redevelopment Block EOS-2 are located approximately 80 feet from the Bay.

Total Petroleum Hydrocarbons

TPH-d, TPH-g, and TPH-mo range were detected in soil and groundwater at concentrations exceeding Parcel E screening criteria. Petroleum hydrocarbons are known to sorb to soil and have low solubility in water. TPH contamination has leached vertically from the reclamation pond soil to the A-aquifer, but has not reached the B-aquifer zones because of the thick aquitard that separates the A- and B-aquifer zones. TPH was detected in groundwater at concentrations exceeding Parcel E screening criteria at 6 of 14 groundwater wells at Redevelopment Block EOS-2. The free product as LNAPL detected in several wells at the former oil reclamation ponds area (IR-03) serves as continuing source of the dissolved phase TPH contamination in groundwater.

Based on maximum concentrations detected during the two most recent quarters of data in the RI data set for Redevelopment Block EOS-2, the estimated 2004 TPH plume extends to the shoreline (see Figure 4-6), suggesting the possibility of physical mixing of groundwater with Bay water. However, a sheet pile wall installed at IR-03 as part of a removal action was intended to limit mixing or migration of contaminated groundwater with Bay water.

4.3.11 Redevelopment Block EOS-3

This section summarizes the site characterization of Redevelopment Block EOS-3, including the site history (see Section 4.3.11.1), the geology and hydrogeology (see Section 4.3.11.2), the nature and extent of chemicals in soil (see Section 4.3.11.3), the nature and extent of chemicals in groundwater (see Section 4.3.11.4), and the fate and transport of chemicals in soil and

groundwater (see Section 4.3.11.5). The planned reuse for this block is open space. No tenants are currently present on this redevelopment block.

4.3.11.1 Site History

Redevelopment Block EOS-3 is located in the southern portion of Parcel E. This redevelopment block includes portions of two IR sites: IR-02 Southeast and IR-02 Central. Site features within Redevelopment Block EOS-3 are shown on Figure 1-13. The subsections below discuss the historical uses of IR-02 Southeast and IR-02 Central within the boundaries of Redevelopment Block EOS-3.

4.3.11.1.1 IR-02 Southeast

IR-02 Southeast covers almost all of Redevelopment Block EOS-3, except for the northwestern-most portion. Most of IR-02 Southeast lies within Redevelopment Block EOS-3, while the remainder lies within Redevelopment Block EMI-1. IR-02 Southeast covers approximately 6.2 acres in Redevelopment Block EMI-1 and consists of the following site features within Redevelopment Block EOS-3 (see Figure 1-13):

- Burn Disposal Area
- Metal Debris Reef
- Triple A Site 13 (hazardous waste disposal practices at Tank S-505)

Burn Disposal Area

The southeastern portion of IR-02 Southeast was formerly the site of a burn disposal area for domestic refuse. From 1945 to 1948, the Navy operated an open, 1-acre burn disposal area for domestic garbage and refuse-type wastes (NEESA 1984). Approximately 23,000 tons of domestic solid waste was estimated to have been disposed of and incinerated at IR-02 Southeast during this 3-year period. Although trash was burned daily, significantly reducing the volume of solid waste at the site, some solid waste may have been disposed of at IR-02 Southeast without being burned (NEESA 1984). The burn disposal area was closed in 1948 because odor and smoke affected an adjacent Navy housing complex. Upon closure in 1948, the burn disposal area was graded and covered with fill (NEESA 1984).

Metal Debris Reef

The metal debris reef area covers 1.2 acres at IR-02 Southeast (see Figure 2-4). The area contains a reef composed of about 8,500 cubic yards of concrete debris, metal scrap, and metal slag. Slag and debris extend to about 12 feet bgs. Site characterization found elevated levels of cesium-137 and radium-226 and nonradioactive chemicals (metals, PCBs, and pesticides). The reef was formed from refuse and metal debris from a metal foundry (Building 241), smelter (Building 408), and the adjacent open burn disposal area. The Navy used the open burn disposal

area from 1945 to 1948 to burn domestic garbage and refuse, including metal debris (Tetra Tech, LFR, and U&A 1997).

The Navy initiated a TCRA at the metal debris reef area to eliminate any potential threat posed by future migration or release of chemicals or low-level radioactive material from the area to the surrounding environment. The TCRA consisted of radiological surveys, screening, sampling, excavation, off-site disposal of contaminated material, and post-excavation confirmation sampling (TtECI 2007b). Excavation was conducted in a series of lifts to remove low-level radiological material and incidental chemical contamination to a maximum depth of between 3 and 6 feet bgs. ABM was not observed during the TCRA at the metal debris reef area. Excavation was completed in September 2005, with more than 11,000 cubic yards of soil and debris removed.

One post-excavation sample result (Systematic Grid 110) of 0.1181 pCi/g for cesium-137 exceeded the radiological remediation goal for cesium-137 of 0.113 pCi/g. Another post-excavation sample result (Metal Debris Reef [MDR] Survey Unit 6, point B3, Grid 115) of 2.287 pCi/g for radium-226 exceeded the radiological remediation goal for radium-226 of 1.0 pCi/g above background (TtECI 2007b).

In addition, nonradiological chemical concentrations in post-excavation soil exceeded screening criteria (see Figure 4-5 of TtECI 2007b). The maximum detected concentration of Aroclor-1260 was 5,100 micrograms per kilogram at a depth of 1 foot bgs in Grid 105 (sample ID 72-MDR-1014A). The maximum detected concentration of copper was 3,900 mg/kg at a depth of 3 feet bgs in the Grid 93 sidewall [sample ID 72-MDR-1011 (FD)].

The excavated soil and debris was screened for radioactive materials to ensure proper disposal. All radioactive materials encountered during the removal action were packaged and disposed of off site as radioactive waste. A detailed description of actions that have been taken under the TCRA is presented in the Final Removal Action Completion Report (TtECI 2007b).

Triple A Site 13 (hazardous waste disposal practices at Tank S-505)

IR-02 Southeast is the former location of a 630,000-gallon steel AST; this tank was identified as Tank S-505. Tank S-505 was constructed in 1949 and located on Mahan Street between "J" and "K" Streets. Tank S-505 was used by the Navy to store fuel oil to power the steam-generating power plant across "J" Street at Building 521 (HLA 1994a). Tank S-505 was emptied and removed in 1993. Visible petroleum contamination of soil at locations near and beneath the tank was observed during removal action activities; contamination was observed to depths of approximately 3 feet bgs in areas excavated for piping removal (HLA 1994a). Steam lines and fuel lines inside the bermed area were removed in 1993; steam and fuel lines outside the bermed area remain intact (HLA 1994a). Storm drain lines inside the bermed area have been capped but remain intact. A liner was placed over the former tank and bermed area; soil was not removed (HLA 1994a).

Triple A Site 13 was identified in 1986 during the SFDA investigation of Triple A hazardous waste disposal practices. Triple A Site 13 includes the bermed area around Tank S-505 and the adjacent shoreline across "K" Street. Sometime between 1976 and 1986, Triple A allegedly used Tank S-505, its 28,000-square-foot berm area, and adjacent ponds and trenches to store waste oil. Interviews with former Triple A and HPS personnel revealed that mixtures of waste oil, solvents, bilge water, and other liquid wastes from ships under repair were transported to Tank S-505. The waste liquids were moved to Tank S-505 by truck or by steam lines diverted to run from Dry Dock 4 in Parcel D (DHS 1988). Once the contents of Tank S-505 had separated into oil and water layers, Triple A personnel allegedly drained the water portion of the tank and dumped the water on the ground along the Parcel E shoreline (DHS 1988). Oil and other wastes mixed with the water were also dumped onto the ground (DHS 1988).

4.3.11.1.2 IR-02 Central and Triple A Site 17

A small portion of IR-02 Central and Triple A Site 17 is located at the northern tip of Redevelopment Block EOS-3. IR-02 Central lies primarily within Redevelopment Blocks EOS-1, EOS-2, and 44. Triple A Site 17 is located primarily within Redevelopment Block EOS-2. No site features from IR-02 Central or Triple A Site 17 are located in Redevelopment Block EOS-3. A description of the site features associated with IR-02 Central and Triple A Site 17 is presented in Section 4.3.10, Redevelopment Block EOS-2.

4.3.11.2 Geology and Hydrogeology

This section briefly discusses the geological and hydrogeological features beneath Redevelopment Block EOS-3. A full description of geology and hydrogeology at Parcel E is presented in Sections 3.4 and 3.5, respectively.

Most of Redevelopment Block EOS-3 is covered by ruderal vegetation, with riprap lining the shoreline. From the surface downward, the geologic units at Redevelopment Block EOS-3 consist of Artificial Fill, Undifferentiated Upper Sand Deposits, Bay Mud Deposits, Undifferentiated Sedimentary Deposits, and Franciscan Complex bedrock.

The Undifferentiated Upper Sand Deposits, which underlie the Artificial Fill, consist predominantly of dark greenish-gray, poorly graded sand, with minor fractions of clay, gravel, or silt and 5 to 60 percent shell fragments. This stratigraphic unit ranges from approximately 3 to 18 feet thick, and dips gently from the northwest toward the southeast. The Undifferentiated Upper Sand Deposits consist of dark green poorly graded sand, with some clay and shell fragments. The top of the Bay Mud Deposits was encountered from 15 to 27 feet bgs, and consist predominantly of dark greenish-gray, fat clay, with varying proportions of sand and silt (0 to 20 percent) and a trace to 25 percent shell fragments. No borings within Redevelopment Block EOS-3 were deep enough to penetrate through the Bay Mud Deposits. The Bay Mud Deposits are present beneath nearly the entire block except for a small area along the northeast margin of the northwest arm of the block (see Figure 3-7). The surface of the Bay Mud Deposits dips from the northwest toward the southeast across IR-02 Southeast; the unit also thickens in this same direction. No borings at Redevelopment Block EOS-3 were deep enough to encounter

the Undifferentiated Sedimentary Deposits or bedrock. As shown on Figure 3-4, the bedrock surface elevation in the vicinity of Redevelopment Block EOS-3 slopes to the south away from the bedrock high at "Shag Rock" (see Figure 3-16). Depth to bedrock ranges from 20 to 125 below msl (see Figure 3-8).

The hydrostratigraphy beneath Redevelopment Block EOS-3 consists of an A-aquifer, an aquitard, and a B-aquifer. The A-aquifer consists of Artificial Fill and Upper Differentiated Sand Deposits. Based on average groundwater elevations measured in A-aquifer wells, the depth to groundwater in the A-aquifer ranges from 5.0 to 7.5 feet bgs throughout the redevelopment block. The groundwater flow direction for the A-aquifer is generally to the south and southwest (toward the Bay) during the wet season and north and northwest (inland) during the dry season. The B-aquifer is separated from the A-aquifer by the Bay Mud aquitard (see Figure 3-7). Beneath Redevelopment Block EOS-3, the A- and B-aquifers are not in direct hydraulic communication. The general direction of groundwater flow for the B-aquifer is approximately southeast (see Figures 3-11 and 3-12).

4.3.11.3 *Nature and Extent of Chemicals in Soil*

This section summarizes the evaluation of the nature and extent of chemicals in soil at Redevelopment Block EOS-3. The evaluation follows the approach for identifying chemicals and their spatial extent described in Section 4.1.

4.3.11.3.1 *Identification and Spatial Distribution of Chemicals in Soil*

This section summarizes the chemicals identified in soil at Redevelopment Block EOS-3. Approximately 229 samples were collected at Redevelopment Block EOS-3. Figure 4.3.11-1 shows the locations where soil samples were collected from Redevelopment Block EOS-3. Soil samples were analyzed for metals (including hexavalent chromium), VOCs, SVOCs, cyanide, pesticides, PCBs, TPH, and dioxins and furans. Cyanide was not detected above the reporting limits in any of the soil samples; therefore, it is not discussed further in this section.

Tables 4.3.11-1 and 4.3.11-2 present the summary statistics for chemicals that were detected at concentrations exceeding the residential and industrial soil screening criteria. Table 4.3.11-1 presents statistics for 151 surface (0 to 10 feet bgs) soil samples. Table 4.3.11-2 presents statistics for 61 subsurface (deeper than 10 feet bgs) soil samples. Appendix C includes the complete soil data set used to generate the summary statistics tables for this redevelopment block.

The chemicals detected in soil are described below by analytical group: metals, VOCs, SVOCs, pesticides, PCBs, TPH, and dioxins and furans.

Metals

The risk due to metals is primarily in the upper 10 feet of soil (see Appendix I); therefore, this discussion focuses on the data for metals in surface soil samples. Twenty-four metals were detected in soil samples collected from the surface to a depth of 10 feet bgs. Of the 24 metals detected, 12 metals had one or more detected concentrations exceeding the residential soil screening criteria; only two metals exceeded industrial screening criteria.

The lateral extent of elevated concentrations of metals was evaluated to identify areas within Redevelopment Block EOS-3 where metals exceeded Parcel E industrial screening criteria in soil. Figure 4.3.11-2 shows the sampling locations where concentrations of metals exceeded Parcel E industrial screening criteria and presents the elevated concentrations at each location. Concentrations of metals exceeded the screening criteria in contiguous soil sampling locations dispersed throughout the south and central portions of Redevelopment Block EOS-3.

The southern portion of Redevelopment Block EOS-3 is associated with the burn disposal area operated by the Navy for burning domestic garbage and refuse-type waste, and the metal debris reef that was removed in 2005 from the shoreline. Activities related to the disposal area and the metal debris reef may have resulted in releases of metals. The central portion of Redevelopment Block EOS-3 includes the bermed area at Triple A Site 13, which coincides with the former AST the Navy used to store fuel oil for the power plant and later by Triple A as a waste oil disposal site. Activities at this site may have resulted in releases of metals. The area south of the bermed area at Triple A Site 13 is also associated with the former AST the Navy used to store fuel oil for the power plant and later by Triple A as a waste oil disposal site. During Triple A's use of the site, oily waste liquids were placed in the tank. After the liquids were allowed to settle, the water portion was drained from the tank and dumped on the ground along the Parcel E shoreline (DHS 1988). Activities at this site may have resulted in releases of metals.

Volatile Organic Compounds

Twelve VOCs were detected in samples collected from surface soil (0 to 10 feet bgs); only naphthalene was detected at concentrations exceeding the Parcel E residential screening criteria in 5 of 143 samples; no VOCs were detected at concentrations that exceeded industrial screening criteria (see Figure 4.3.11-3 and Appendix C). Ten VOCs were detected in samples collected from subsurface soil (deeper than 10 feet bgs); no VOCs exceeded the Parcel E residential or industrial screening criteria (see Appendix C). As a result, the nature and extent of VOCs in soil at Redevelopment Block EOS-3 is not discussed further in this section.

Semivolatile Organic Compounds

Twenty-eight SVOCs were detected in one or more samples collected from surface soil (0 to 10 feet bgs). However, only eight SVOCs were detected at concentrations exceeding Parcel E residential screening criteria, seven of which also exceeded the Parcel E industrial screening criteria (see Table 4.3.11-1). Twenty-eight SVOCs were detected in samples collected from

subsurface soil (deeper than 10 feet bgs); however, only 6 SVOCs exceeded Parcel E residential screening criteria and 4 SVOCs exceeded Parcel E industrial criteria.

The lateral extent of elevated concentrations of SVOCs was evaluated to identify areas within Redevelopment Block EOS-3 where SVOCs exceeded Parcel E industrial screening criteria in soil. Figure 4.3.11-4 shows the sampling locations where concentration of SVOCs exceeded Parcel E industrial screening criteria and presents the elevated concentrations at each location. Concentrations of SVOCs exceeded the screening criteria in soil sampling locations dispersed throughout the central and southern portions of Redevelopment Block EOS-3.

The central portion of Redevelopment Block EOS-3 includes the bermed area at Triple A Site 13, which coincides with the former AST used by the Navy to store fuel oil for the power plant and later by Triple A as a waste oil disposal site. Activities at this site may have resulted in releases of SVOCs. The area south of the bermed area at Triple A Site 13 is also associated with the former AST used by the Navy to store fuel oil for the power plant and later by Triple A as a waste oil disposal site. During Triple A's use of the site, oily waste liquids were placed in the tank. After the liquids were allowed to settle, the water portion was drained from the tank and dumped on the ground along the Parcel E shoreline (DHS 1988). Activities at this site may have resulted in releases of SVOCs. The southern portion of Redevelopment Block EOS-3 is associated with the burn disposal area operated by the Navy for burning domestic garbage and refuse-type waste and with the metal debris reef. Activities related to the disposal areas may have resulted in releases of SVOCs.

Pesticides

Nineteen pesticides were detected in samples collected from surface soil (0 to 10 feet bgs); however, only 5 pesticides were detected at concentrations exceeding the Parcel E residential screening criteria; only two pesticides were detected at concentrations that exceeded industrial screening criteria. Nine pesticides were detected in samples collected from subsurface soil (deeper than 10 feet bgs); however, only three pesticides exceeded Parcel E residential screening criteria.

The lateral extent of elevated concentrations of pesticides was evaluated to identify areas within Redevelopment Block EOS-3 where pesticides exceeded Parcel E industrial screening criteria in soil. Figure 4.3.11-5 shows the sampling locations where concentrations of pesticides exceeded Parcel E industrial screening criteria and presents the elevated concentrations at each location. Concentrations of pesticides exceeded Parcel E screening criteria in two soil sampling locations in the southern portion of Redevelopment Block EOS-3.

The southern portion of Redevelopment Block EOS-3 is associated with the burn disposal area the Navy operated for burning domestic garbage and refuse-type waste, and the metal debris reef.

Polychlorinated Biphenyls

Three PCBs were detected in samples collected from surface soil (0 to 10 feet bgs) (see Table 4.3.11-1), all of which exceeded Parcel E residential screening criteria; only two PCBs were detected at concentrations that exceeded industrial screening criteria. Three PCBs also were detected in samples collected from subsurface soil (deeper than 10 feet bgs); however, only two PCBs exceeded Parcel E residential screening criteria (see Table 4.3.11-2).

The lateral extent of elevated concentrations of PCBs was evaluated to identify areas within Redevelopment Block EOS-3 where PCBs exceeded Parcel E industrial screening criteria in soil. Figure 4.3.11-6 shows the sampling locations where concentrations of PCBs exceeded Parcel E industrial screening criteria and presents the elevated concentrations at each location. Concentrations of PCBs exceeded Parcel E screening criteria in contiguous soil sampling locations dispersed throughout the southern and central portions of Redevelopment Block EOS-3.

The southern portion of Redevelopment Block EOS-3 is associated with the burn disposal area the Navy operated for burning domestic garbage and refuse-type waste, and the metal debris reef. Activities related to the disposal areas may have resulted in releases of PCBs. The central portion of Redevelopment Block EOS-3 includes the bermed area at Triple A Site 13, which coincides with the former AST used by the Navy to store fuel oil for the power plant and later by Triple A as a waste oil disposal site. Activities at this site may have resulted in releases of PCBs. The area south of the bermed area at Triple A Site 13 is also associated with the former AST used by the Navy to store fuel oil for the power plant and later by Triple A as a waste oil disposal site. During Triple A's use of the site, oily waste liquids were placed in the tank. After the liquids were allowed to settle, the water portion was drained from the tank and dumped on the ground along the Parcel E shoreline (DHS 1988). Activities at this site may have resulted in releases of PCBs.

Total Petroleum Hydrocarbons

TTPH concentrations exceeded the soil source screening criterion at three locations; none of the locations were collocated with CERCLA chemicals (see Figure 4.3.11-6). No free product was detected in monitoring wells within this redevelopment block (Tetra Tech 2002c). As a result, the nature and extent of TTPH in soil at Redevelopment Block EOS-3 is not discussed further in this section.

Dioxins and Furans

Twenty-five dioxin/furans were detected in samples collected from surface soil (0 to 10 feet bgs) (see Table 4.3.11-1); 15 of which exceeded Parcel E residential screening criteria, while 12 exceeded Parcel E industrial screening criteria (see Table 4.3.11-1). Seventeen dioxin/furans were detected in samples collected from subsurface soil (deeper than 10 feet bgs), 14 of which exceeded Parcel E residential criteria and 5 of which exceeded Parcel E industrial screening criteria.

The lateral extent of elevated concentrations of dioxins/furans was evaluated to identify areas within Redevelopment Block EOS-3 where these dioxins/furans exceeded Parcel E industrial screening criteria in soil. Figure 4.3.11-5 shows the sampling locations where concentrations of dioxins/furans exceeded Parcel E industrial screening criteria and presents the elevated concentrations at each location. Concentrations of dioxins/furans exceeded Parcel E screening criteria in contiguous soil sampling locations dispersed throughout the southern portion of Redevelopment Block EOS-3.

The southern portion of Redevelopment Block EOS-3 is associated with the burn disposal area operated by the Navy for burning domestic garbage and refuse-type waste, and the metal debris reef. Activities related to the disposal areas may have resulted in releases of dioxins and furans.

4.3.11.3.2 Extent of Chemicals in Soil

The screening process identified two areas within Redevelopment Block EOS-3 where concentrations of chemicals in soil at contiguous sampling locations exceeded Parcel E screening criteria:

- Central portion of Redevelopment Block EOS-3, in the area south of the bermed area: metals, SVOCs, and PCBs (see Figures 4.3.11-2, 4.3.11-4, and 4.3.11-6)
- Southern portion of Redevelopment Block EOS-3: metals, SVOCs, pesticides, PCBs, and dioxin/furans (see Figures 4.3.11-2, 4.3.11-4, 4.3.11-5, and 4.3.11-6)

The central portion of Redevelopment Block EOS-3 includes the bermed area at Triple A Site 13, which coincides with the former AST used by the Navy to store fuel oil for the power plant and later by Triple A as a waste oil disposal site. Activities at this site may have resulted in releases of metals, SVOCs, and PCBs. The estimated size of the area is 120 feet (east-west) by 75 feet (north-south). The depth to groundwater is 5.2 feet bgs.

The area south of the bermed area at Triple A Site 13 is also associated with the former AST used by the Navy to store fuel oil for the power plant and later by Triple A as a waste oil disposal site. During Triple A's use of the site, oily waste liquids were placed in the tank. After the liquids were allowed to settle, the water portion was drained from the tank and dumped on the ground along the Parcel E shoreline (DHS 1988). Activities at this site may have resulted in releases of metals, SVOCs, and PCBs. The estimated size of the area is 75 feet (east-west) by 250 feet (north-south). The depth to groundwater is 5.2 feet bgs.

The southern portion of Redevelopment Block EOS-3 is associated with the burn disposal area operated by the Navy for burning domestic garbage and refuse-type waste. Activities related to the disposal area may have resulted in releases of metals, SVOCs, pesticides, PCBs, and dioxins/furans. A removal action was conducted along the shoreline in 2006 at the metal debris reef along the southwest shoreline. The estimated size of the area is 300 feet (east-west) by 500 feet (north-south). The depth to groundwater is 7.5 feet bgs.

4.3.11.4 Nature and Extent of Chemicals in Groundwater

This section summarizes the evaluation of the nature and extent of chemicals detected in groundwater samples collected from monitoring wells associated with Redevelopment Block EOS-3. Figure 4.3.11-7 shows the locations of the groundwater monitoring wells associated with Redevelopment Block EOS-3.

Tables 4.3.11-3 and 4.3.11-4 present the summary statistics for chemicals that were detected in the A-aquifer and the B-aquifer, respectively. No bedrock water-bearing zone wells are associated with Redevelopment Block EOS-3. Table 4.3.11-3 presents statistics for data from six A-aquifer wells; Table 4.3.11-4 presents statistics for data from one B-aquifer well. Chemicals that were retained for evaluation based on consideration of the factors described in Section 4.1.2.2 are shaded and shown in bold font in these tables. Appendix D includes the complete groundwater data set for this redevelopment block.

4.3.11.4.1 Chemicals in A-Aquifer Groundwater

Six A-aquifer wells are associated with Redevelopment Block EOS-3 (see Figure 4.3.11-7). Groundwater samples collected from the A-aquifer wells were analyzed for metals (including hexavalent chromium), VOCs, SVOCs, cyanide, pesticides, PCBs, and TPH. Cyanide was not detected in any groundwater samples collected from A-aquifer wells associated with Redevelopment Block EOS-3; therefore, this chemical is not discussed further in this section.

The chemicals that were detected in groundwater samples collected from the A-aquifer are evaluated below by the following analytical groups: metals, VOCs, SVOCs, pesticides, PCBs, and TPH.

Metals

Samples collected from the A-aquifer wells associated with Redevelopment Block EOS-3 were analyzed for metals during one or more rounds of sampling; 23 metals were detected. Of the 23 metals detected, 4 metals (copper, nickel, silver, and zinc) exceeded the appropriate screening criterion (surface water criteria, or HGALs if greater than surface water criteria) listed in Table 4.3.11-3. The spatial and temporal distribution of these four metals in groundwater is discussed below.

- Copper exceeded its surface water criterion (3.1 µg/L) and its HGAL (28.04 µg/L) in 6 of 36 groundwater samples. The six exceedances were all detected in samples from well IR02MW300A. The table on the following page summarizes the analytical results for copper for this well, with the HGAL exceedances highlighted in bold.

Sampling Location	Sample Date	Copper (µg/L)	Qualifier
IR02MW300A	07-06-1992	6.9	U
	08-26-1992	7.2	
	03-20-1996	45.8	J
	03-28-2001	43.3	
	07-16-2002	41.4	
	09-20-2002	38.7	U
	06-16-2004	114	
	09-15-2004	53	
	11-30-2004	31.3	

As shown in the table above, copper concentrations in this well have consistently exceeded the HGAL, although only by a factor of 1 to 4. In addition, grab groundwater sample concentrations detected in 1992 in open boreholes IR02B294 and IR02B295 (see Figure K-1 in Appendix K) exceeded the HGAL and ranged from 366 to 2,350 µg/L. As discussed in Section 4.1.2.1, the concentrations of metals measured in grab groundwater samples tend to be biased high because of high turbidity associated with such samples. However, the grab groundwater data provided additional points of reference for the delineation of the 2004 plume of copper in groundwater at this redevelopment block (see Figure 4-3). Analytical results from grab groundwater samples are not included in the RI dataset but are presented in Appendix K. The source of copper in groundwater is probably related to sandblast waste used as fill material in IR-02 Southeast.

- Nickel exceeded its surface water criterion (8.2 µg/L) and its HGAL (96.48 µg/L) in only 1 of 39 groundwater samples. The single exceedance (3,430 µg/L) was detected in a sample collected from well IR02MWB-5 in March 2001. Nickel was not detected in the subsequent two samples collected from this well in July and September 2002.
- Silver exceeded its surface water criterion (0.38 µg/L) and its HGAL (7.43 µg/L) in only 1 of 35 groundwater samples. The single exceedance (7.5 µg/L) was detected in a sample collected from well IR02M300A in September 2002 and was qualified as estimated because it was less than the PQL. Silver was not detected in the subsequent three samples collected from this well in June, September, and November 2004.
- Zinc exceeded its surface water criterion (81 µg/L) and its HGAL (75.68 µg/L) in 8 of 36 groundwater samples, with concentrations ranging from 87.9 to 182 µg/L. The eight exceedances were detected in eight of nine samples collected from well IR02MW300A. The table on the following page summarizes the analytical results for zinc for this well, with the surface water criterion exceedances highlighted in bold.

Sampling Location	Sample Date	Zinc (µg/L)	Qualifier
IR02MW300A	07-06-1992	87.9	J
	08-26-1992	21.5	
	03-20-1996	174	J
	03-28-2001	117	
	07-16-2002	125	
	09-20-2002	145	
	06-16-2004	108	
	09-15-2004	182	J
	11-30-2004	88.1	J

As shown in the table above, zinc concentrations in this well have consistently exceeded the HGAL, although only by a factor of 1 to 2. In addition, grab groundwater sample concentrations detected in 1992 in open boreholes IR02B294 and IR02B295 (see Figure K-1 in Appendix K) exceeded the HGAL and ranged from 727 to 4,620 µg/L. As discussed in Section 4.1.2.1, the concentrations of metals measured in grab groundwater samples tend to be biased high because of high turbidity associated with such samples. However, the grab groundwater data provided additional points of reference for the delineation of the 2004 plume of zinc in groundwater at this redevelopment block (see Figure 4-3). Analytical results from grab groundwater samples are not included in the RI dataset but are presented in Appendix K. The source of zinc in groundwater is probably related to sandblast waste used as fill material in IR-02 Southeast.

Copper and zinc in A-aquifer groundwater at Redevelopment Block EOS-3 are discussed further in Section 4.3.11.5.

Volatile Organic Compounds

Samples collected from the A-aquifer wells associated with Redevelopment Block EOS-3 were analyzed for VOCs during one or more rounds of sampling; five VOCs were detected. Of the five VOCs detected, two VOCs (chloroform and PCE) exceeded at least one of the appropriate screening criteria (vapor intrusion and surface water criteria) listed in Table 4.3.11-3. The spatial and temporal distribution of these two VOCs is discussed below.

- Chloroform exceeded its vapor intrusion criterion (0.7 µg/L) in 1 of 36 groundwater samples. The single exceedance (2 µg/L) was detected in a duplicate sample collected from well IR02MW175A in July 1992. Chloroform was not detected in either the original July 1992 sample nor in the subsequent seven samples collected from this well (from 1992 through 2004).
- PCE exceeded its vapor intrusion criterion (0.54 µg/L) in 2 of 36 groundwater samples. The two exceedances were detected in samples collected from well IR02MW175A (6 µg/L in July 1992) and IR02MW206A2 (1 µg/L in June 1992). The PCE exceedance at IR02MW206A2 was an estimated concentration. PCE was not detected in the subsequent four or more samples collected from each of these wells (from 1992 through 2004).

As a result, VOCs in A-aquifer groundwater at Redevelopment Block EOS-3 are not discussed further in this section.

Semivolatile Organic Compounds

Samples collected from the A-aquifer wells associated with Redevelopment Block EOS-3 were analyzed for SVOCs during one or more rounds of sampling; four SVOCs were detected. Of the four SVOCs detected, none exceeded the appropriate screening criteria (surface water criteria) listed in Table 4.3.11-3. As a result, SVOCs in A-aquifer groundwater at Redevelopment Block EOS-3 are not discussed further in this section.

Pesticides

Samples collected from the A-aquifer wells associated with Redevelopment Block EOS-3 were analyzed for pesticides during one or more rounds of sampling; 16 pesticides were detected. All but two of the detections were qualified as estimated because the concentrations were below the PQL. Of the 16 pesticides detected, 8 pesticides (4,4'-DDT, alpha-chlordane, gamma-chlordane, endosulfan I, endosulfan II, endrin, heptachlor epoxide, and methoxychlor) exceeded the appropriate criteria (surface water) listed in Table 4.3.11-3. The exceedances all occurred in well IR02MW300A in a sample collected in November 2004. Based on the low frequency of detection and the estimated qualifier for these detections, pesticides in A-aquifer groundwater at Redevelopment Block EOS-3 are not discussed further in this section.

Polychlorinated Biphenyls

Samples collected from the A-aquifer wells associated with Redevelopment Block EOS-3 were analyzed for PCBs during one or more rounds of sampling; one PCB was detected (Aroclor-1260). Aroclor-1260 exceeded the surface water criterion (0.03 µg/L), which is less than the reported detection limits (ranging from 0.1 to 10 µg/L). The single exceedance (0.8 µg/L) occurred in a sample collected from well IR02MWB-5 in August 1992. As a result, PCBs in A-aquifer groundwater at Redevelopment Block EOS-3 are not discussed further in this section.

Total Petroleum Hydrocarbons

Samples collected from the A-aquifer wells associated with Redevelopment Block EOS-3 were analyzed for TPH products during one or more rounds of sampling. TPH-g was not detected in any of the groundwater samples. TPH-d and TPH-mo were each detected once in groundwater samples collected from one A-aquifer well (IR02MW300A). The concentrations detected for TPH-d and TPH-mo were 61 and 210 µg/L (see Table 4.3.11-3). These concentrations were less than the TPH screening criteria for groundwater. As a result, TPH in A-aquifer groundwater at Redevelopment Block 41 are not discussed further in this section.

4.3.11.4.2 Chemicals in B-Aquifer Groundwater

One B-aquifer well (IR02MW210B) is associated with Redevelopment Block EOS-3 (see Figure 4.3.11-7). Groundwater samples collected from the B-aquifer well were analyzed for metals (including hexavalent chromium), VOCs, SVOCs, pesticides, PCBs, and TPH. SVOCs, pesticides, PCBs, and TPH were not detected in any groundwater samples collected from this B-aquifer well; therefore, these chemicals are not discussed further in this section. Table 4.3.11-4 presents the summary statistics for chemicals detected in samples collected from the B-aquifer wells.

The chemicals that were detected in groundwater samples collected from the B-aquifer are evaluated below by the following analytical groups: metals and VOCs.

Metals

Samples collected from the B-aquifer well associated with Redevelopment Block EOS-3 were analyzed for metals during one or more rounds of sampling; 13 metals were detected. Of the 13 metals detected, 3 metals (arsenic, copper, and manganese) were detected at concentrations exceeding one or more screening criteria (domestic use criteria, surface water criteria, and MCLs) listed in Table 4.3.11-4. The spatial and temporal distribution of these three metals is discussed below.

- Arsenic exceeded its domestic use criterion (0.007 µg/L) in all three of the groundwater samples collected from well IR02MW210B (in January, July, and August 1992), but all concentrations were below the MCL criterion (10 µg/L). This well is located approximately 180 feet from the Bay. The table below summarizes the analytical results for arsenic for this well, with the domestic use criterion exceedances highlighted in bold.

Sampling Location	Sample Date	Arsenic (µg/L)	Qualifier
IR02MW210B	01-30-1992	5.2	J
	07-21-1992	4.3	
	08-26-1992	5.1	
	08-26-1992	4.5	

All of the arsenic detections exceeded the domestic use criteria by over two orders of magnitude. Although HGALs were derived for the A-aquifer, arsenic concentrations in the B-aquifer are below the HGAL and therefore are believed to be ubiquitous.

- Copper exceeded its surface water criterion (3.1 µg/L) in one of three groundwater samples collected from well IR02MW210B in January 1992, with a concentration of 4.7 µg/L. This well is located approximately 180 feet from the Bay. Copper was not detected in the two subsequent samples collected from this well in July and August 1992.

- Manganese exceeded its domestic use criterion (880 µg/L) in two of the three most recent groundwater samples in the RI data set collected from well IR02MW210B (July and August 1992). This well is located approximately 180 feet from the Bay. The table below summarizes the analytical results for manganese for this well, with the domestic use criterion exceedances highlighted in bold.

Sampling Location	Sample Date	Manganese (µg/L)	Qualifier
IR02MW210B	01-30-1992	822	
	07-21-1992	1,060	
	08-26-1992	2,220	J
	08-26-1992	2,210	J

The most recent manganese detections in the RI data set at IR02MW210B exceeded the domestic use criteria, although only by a factor of 1 to 3. Although HGALs were derived for the A-aquifer, manganese concentrations in the B-aquifer are below the HGAL and therefore are believed to be ubiquitous.

Metals in B-aquifer groundwater at Redevelopment Block EOS-3 are not discussed further in this section.

Volatile Organic Compounds

Samples collected from the B-aquifer well associated with Redevelopment Block EOS-3 were analyzed for VOCs during one or more rounds of sampling; three VOCs were detected (ethylbenzene, toluene, and xylenes). Of the three VOCs detected, none exceeded the appropriate screening criteria (domestic use criteria, surface water criteria, or MCLs) listed in Table 4.3.11-4. As a result, VOCs in B-aquifer groundwater at Redevelopment Block EOS-3 are not discussed further in this section.

4.3.11.4.3 Extent of Chemicals in Groundwater

The screening process identified one area within Redevelopment Block EOS-3 where concentrations of chemicals in A-aquifer groundwater consistently exceeded Parcel E screening criteria:

- Monitoring Well IR02MW300A: copper and zinc (see Figure 4-3 and Table 4-3)

The source of these metals in A-aquifer groundwater is probably related to sandblast waste used as fill material in IR-02 Southeast.

4.3.11.5 Evaluation of Chemical Fate and Transport

As described in Sections 4.3.11.3 and 4.3.11.4, two areas were identified where soil sampling results exceeded Parcel E soil screening criteria and one well was identified where groundwater sampling results exceeded Parcel E groundwater screening criteria in Redevelopment Block EOS-3. Chemicals identified in areas exceeding Parcel E screening criteria in soil are metals (arsenic and lead); SVOCs; PCBs; pesticides; and dioxins and furans. Copper and zinc were identified in A-aquifer groundwater. The persistence and mobility of these chemicals in soil and groundwater is discussed below.

Metals

Arsenic and Lead

The mobility of arsenic and lead is highly dependant on soil pH and infiltration of water. Soil pH within Redevelopment Block EOS-3 ranges from 7.6 to 12 (see Appendix C). Average pH calculated as described in Section 4.3.2.5 is 8.3. All of 66 soil pH measurements were above 7.5. The predominantly above-neutral pH values measured in the vadose zone soil samples indicate that site conditions do not favor leaching of these metals into groundwater (see Appendix H). Although arsenic may be somewhat mobile in the basic soils, its concentrations in groundwater have not exceeded Parcel E screening criteria. Concentrations of lead in groundwater also have not exceeded Parcel E screening criteria. Therefore, the migration of arsenic and lead from the vadose zone soils to groundwater appears to be limited.

Copper

Copper strongly sorbs to soil, and the sorption rate is increased with higher pH. The predominantly above-neutral pH values measured in the vadose zone soil samples indicate that site conditions do not favor leaching of copper into groundwater (see Appendix H). Copper concentrations exceeding Parcel E screening criteria were detected in groundwater at only one well (IR02MW300A). Sorption and coprecipitation with various oxides is expected to constitute an important removal mechanism of copper from groundwater. The estimated 2004 copper plume in groundwater is limited to the area around Well IR02MW300A, which is located approximately 85 feet from the Bay (see Figure 4-3). It is expected that migration of copper from vadose zone soil to groundwater and continued migration with groundwater would be limited.

Zinc

Zinc was detected at concentrations exceeding Parcel E screening criteria in soil and in groundwater at one well (IR02MW300A) in Redevelopment Block EOS-3. The migration of zinc is expected to be very limited as a result of metal precipitation or sorption to soil under the alkaline conditions. Based on the tendency of zinc to sorb to soil or aquifer materials, the migration of zinc is expected to be limited in soil and groundwater (see Appendix H). The

estimated 2004 zinc plume in groundwater is limited to the area around well IR02MW300A, which is located approximately 85 feet from the Bay (see Figure 4-3).

Semivolatile Organic Compounds

Several SVOCs were detected at concentrations exceeding Parcel E screening criteria. Bis(2-ethylhexyl)phthalate and benzo(b)fluoranthene were selected as the representative SVOCs for evaluation of the fate and transport of SVOCs in soil. SVOCs did not exceed screening criteria in groundwater. The mobility of these PAHs in soil is expected to be limited because these compounds have (1) a very low solubility in water, (2) a low vapor pressure, and (3) a tendency to strongly sorb to organic carbon in soil. The potential for these chemicals to migrate from the vadose zone into groundwater is relatively low.

Pesticides

Dieldrin present in soils was identified for further evaluation at Redevelopment Block EOS-3. Dieldrin has high tendency to strongly sorb to organic matter, and has low solubility and relatively low vapor pressures and Henry's Law values. Dieldrin biodegradation is limited, and dieldrin is expected to persist in the environment. The potential for dieldrin to migrate from soil to groundwater and further migrate with groundwater is relatively low.

Polychlorinated Biphenyls

Aroclor-1260 was detected in surface soil (0 to 10 feet bgs) at concentrations exceeding Parcel E screening criteria for Redevelopment Block EOS-3. Aroclor-1260 has very low solubility and low vapor pressure because of a high level of chlorination (see Appendix H). The potential for Aroclor-1260 to migrate from the vadose zone into groundwater is relatively low.

Dioxins and Furans

Dioxins and furans present in soils were identified for further evaluation at Redevelopment Block EOS-3. Dioxins and furans are generally characterized by low mobility in the environment. 2,3,4,7,8-Pentachlorodibenzofuran (-PECDF) was selected as the representative chemical for evaluation of the fate and transport of dioxins and furans in soil. 2,3,4,7,8-PECDF has low vapor pressure, low solubility, and a tendency to strongly sorb to organic carbon in sediments or aquifer materials. Dioxins and furans are typically immobile in aqueous environments. It is expected that migration of 2,3,4,7,8-PECDF from soil to groundwater and migration with groundwater would be limited.

4.3.12 Redevelopment Block EOS-4

This section summarizes the site characterization of Redevelopment Block EOS-4. Redevelopment Block EOS-4 is not included in the Redevelopment Plan (SFRA 1997); therefore, the Navy determined that the most appropriate reuse for this block is open space. No tenants are currently present on this redevelopment block. Redevelopment Block EOS-4 is located in the northern portion of Parcel E and is a narrow strip of land, consisting of Crisp Avenue and railroad tracks leading off site. Redevelopment Block EOS-4 is bordered to the north and south by non-Navy property. Site features within Redevelopment Block EOS-4 are shown on Figure 1-13 and include a portion of IR-56 and Crisp Avenue.

The northwestern tip of IR-56 lies within Redevelopment Block EOS-4. A small portion of the railroad yard from IR-56 is located within Redevelopment Block EOS-4. A complete description of IR-56 is presented in Section 4.3.7.1.3 for Redevelopment Block 45.

Crisp Avenue is a thoroughfare for San Francisco public transit. Several gas monitoring probes (GMP) are located along the avenue to monitor potential migration of landfill gas. Landfill gas has been detected in the GMPs along Crisp Avenue.

Within Redevelopment Block EOS-4, several sets of railroad tracks leaving the former Golden Gate Railroad Museum merge into one spur that continues into Redevelopment Block EOS-5 and further to non-Navy property.

Table 4.3.12-1 presents the summary statistics for chemicals that were detected at concentrations exceeding the residential and industrial soil screening criteria (shown in Table 4-1). Appendix C includes the complete soil data set used to generate the summary statistics tables for this redevelopment block. Figure 4.3.12-1 shows the locations where soil samples were collected within Redevelopment Block EOS-4.

Eighteen metals were detected in soil samples collected from the surface to a depth of 10 feet bgs. Of the 18 metals detected, 4 metals exceeded residential soil screening criteria; however, none of the metals exceeded their respective HPALs. No metals were detected in concentrations that exceeded industrial soil screening criteria.

Three SVOCs were detected in the two soil samples collected. No SVOCs were detected at concentrations exceeding Parcel E residential or industrial screening criteria (see Appendix B).

No wells are located within Redevelopment Block EOS-4.

Based on available data, the screening process indicated no areas exceeding Parcel E screening criteria are present within Redevelopment Block EOS-4.

4.3.13 **Redevelopment Block EOS-5**

This section summarizes the site characterization of Redevelopment Block EOS-5. Redevelopment Block EOS-5 is located in the northwestern portion of Parcel E. Redevelopment Block EOS-5 is not included in the Redevelopment Plan (SFRA 1997); therefore, the Navy determined that the most appropriate reuse for this block is open space. No tenants are currently present on this redevelopment block. This redevelopment block consists of IR-52.

IR-52 comprises all of Redevelopment Block EOS-5. IR-52 is located west of the HPS boundary and consists of the railroad and its surrounding railroad right-of-way. The Navy-owned railroad right-of-way is 30 feet wide along most of its length and extends approximately 3,200 feet (see Figure 4.3.13-1). The railroad right-of-way excludes the streets it intersects. The railroad consists of one pair of steel rails with wooden railroad ties. The railroad right-of-way on each side of the railroad is unpaved except where intersected by paved streets. The railroad winds through an industrial area and is accessible by local residents and workers.

IR-52 was used by the Navy until 1976, when the site was leased to Triple A (HLA 1994e). The railroad at IR-52 was formerly occupied by the Golden Gate Railroad Museum, which used it for transporting trains to their restoration area in Building 809. Currently, Building 809 is vacant. No documentation is available on the specific use of the railroad by the Navy or Triple A. Stained soil, spilled paint, household waste, and abandoned vehicles were observed during past investigations (HLA 1990b).

Most of the ground surface at Redevelopment Block EOS-5 consists of exposed soil on either side of the railroad tracks. Limited lithologic information is available for the site, and only Artificial Fill was encountered at IR-52. The Artificial Fill consists predominantly of yellowish-brown, olive, or black clayey gravel, sandy clay to clayey sand, silty sand, and intermittent varying proportions of gravel. None of the soil borings installed at the redevelopment block penetrated the entire thickness of the Artificial Fill; therefore, the range of thickness for this unit is unknown. Because borings were not drilled to the Undifferentiated Upper Sand Deposits, the Bay Mud Deposits, or the Undifferentiated Sedimentary Deposits, it is unknown whether these lithologic units occur at IR-52. Even though borings were not drilled sufficiently deep to encounter Franciscan Complex bedrock, this lithologic unit is expected to occur at the redevelopment block.

The hydrostratigraphy beneath Redevelopment Block EOS-5 likely consists of an A-aquifer, an aquitard, and a B-aquifer. The A-aquifer consists of Artificial Fill and Upper Differentiated Sand Deposits (see Figure 3-16). No monitoring wells are located within Redevelopment Block EOS-5; therefore, no data exists on the depth to groundwater.

Table 4.3.13-1 presents the summary statistics for chemicals that were detected at concentrations exceeding the residential and industrial soil screening criteria. Table 4.3.13-1 presents statistics for 39 surface (0 to 10 feet bgs) soil samples. Only one subsurface (deeper than 10 feet bgs) soil sample was collected at Redevelopment Block EOS-5; no chemicals were detected in the sample.

Appendix C includes the complete soil data set used to generate the summary statistics tables for this redevelopment block.

The chemicals detected in soil are described below by analytical group: metals, VOCs, SVOCs, pesticides, PCBs, and TPH.

4.3.13.1 *Metals*

Twenty-one metals were detected in soil samples collected from the surface to a depth of 10 feet bgs (see Table 4.3.13-1). Of the 21 metals detected, 8 metals had one or more detected concentrations exceeding residential soil screening criteria; one sample had detected concentrations of two metals that exceeded the industrial screening criteria (see Figure 4.3.13-2). Metals were not evaluated further because of limited and isolated exceedances of both the residential and industrial screening criteria and HPALs. As a result, the nature and extent of metals in soil at Redevelopment Block EOS-5 is not discussed further in this section.

4.3.13.2 *Volatile Organic Compounds*

Six VOCs were detected in soil samples collected from the surface to 10 feet bgs; no VOCs were detected at concentrations exceeding Parcel E residential or industrial screening criteria (see Appendix C). No VOCs were detected in the soil sample collected deeper than 10 feet bgs. As a result, the nature and extent of VOCs in soil at Redevelopment Block EOS-5 is not discussed further in this section.

4.3.13.3 *Semivolatile Organic Compounds*

Seventeen SVOCs were detected in one or more soil samples collected from the surface to 10 feet bgs. Seven SVOCs were detected at concentrations exceeding Parcel E residential screening criteria, six of which exceeded Parcel E industrial screening criteria and were collected from one sample location (see Table 4.3.13-1). All of the SVOC concentrations exceeding screening criteria or the PQL were detected in samples from one boring (IR52B009) (see Figure 4.3.13-3). No SVOCs were detected in the sample collected from deeper than 10 feet bgs. As a result, the nature and extent of SVOCs in soil at Redevelopment Block EOS-5 is not discussed further in this section.

4.3.13.4 *Pesticides*

Nine pesticides were detected in soil samples collected from the surface to 10 feet bgs; only dieldrin was detected at concentrations exceeding the Parcel E residential screening criterion; no pesticides were detected at concentrations that exceeded industrial screening criteria (see Table 4.3.13-1). Dieldrin was detected in 1 of 37 samples collected at a concentration exceeding the Parcel E residential screening criterion by less than one order of magnitude. No pesticides were detected in the soil sample collected deeper than 10 feet bgs. As a result, the

nature and extent of pesticides in soil at Redevelopment Block EOS-5 is not discussed further in this section.

4.3.13.5 *Polychlorinated Biphenyls*

Two PCBs were detected in soil samples collected from the surface to 10 feet bgs; neither exceeded Parcel E residential or industrial screening criteria (see Appendix C). No PCBs were detected in soil deeper than 10 feet bgs. As a result, the nature and extent of PCBs in soil at Redevelopment Block EOS-5 is not discussed further in this section.

4.3.13.6 *Total Petroleum Hydrocarbons*

TTPH was not detected at concentrations exceeding the HPS soil source screening criterion. As a result, the nature and extent of TTPH in soil at Redevelopment Block EOS-5 is not discussed further in this section.

4.3.13.7 *Extent of Chemicals in Soil*

The screening process indicated no areas exceeding Parcel E screening criteria are present within Redevelopment Block EOS-5.

4.3.14 *Parcel E Shoreline*

This section summarizes the site characterization of the shoreline along Parcel E, including the site description (see Section 4.3.14.1), the geology and hydrogeology (see Section 4.3.14.2), and the nature and extent of chemicals in sediment (see Section 4.3.14.3). The purpose of the Parcel E shoreline characterization was to evaluate if contamination in the Parcel E shoreline has the potential to migrate to sediments in adjacent Parcel F (offshore); and to identify areas within the shoreline that pose an unacceptable ecological risk. Details of the shoreline characterization are presented in Appendix G.

4.3.14.1 *Site Description*

The Parcel E shoreline area extends the full length of the southern boundary of Parcel E from the western edge of the Parcels E and E-2 boundary to the eastern edge at Berth 38, just past the metal debris reef. The shoreline area is the intertidal area between the low- and high-tide watermarks. Most of the shoreline is bounded by the onshore area, which is where the upper riprap begins or where the ridge was formed where the shore abruptly drops to the water. In 2003, debris was identified along the shoreline and removed. The debris consisted of concrete pieces of various sizes, metal rebar, metal wiring, other metal parts, brick, and wood. Riprap, consisting of large pieces of concrete, rebar, and wood, remains along a large portion of the shoreline to prevent erosion.

Intertidal wetlands are located along the Parcel E shoreline (Tetra Tech 2003c). Vegetation observed in the tidal wetlands includes halophytic plant species typically associated with tidal salt or nontidal salt marshes, such as saltgrass and pickleweed. Except for the ice plant (*Carpobrotus edulis*), little vegetation was observed along the Parcel E shoreline (Tetra Tech 2003c). Invertebrates, birds, and mammals also were observed to live or forage along the shoreline (PRC 1996c; Tetra Tech and LFR 2000a).

In 2005, the Navy issued a TCRA for removing metal debris and radiological sources and/or contamination from the metal debris reef area within IR site IR-02 Southeast in Redevelopment Block EOS-3 at Parcel E, and extending south to the shoreline. The metal debris reef area covers 1.2 acres at IR-02 Southeast (see Figure 2-4). The area contains a reef composed of about 8,500 cubic yards of concrete debris, metal scrap, and metal slag. Slag and debris extend to about 12 feet bgs. Site characterization activities found elevated levels of cesium-137 and radium-226 as well as non-radioactive chemicals (metals, PCBs, and pesticides). The reef was formed from refuse and metal debris from a metal foundry (Building 241), smelter (Building 408), and the adjacent open burn disposal area. The open burn disposal area was used by the Navy from 1945 to 1948 to burn domestic garbage and refuse, including metal debris (Tetra Tech, LFR, and U&A 1997). The Navy completed the TCRA at the metal debris reef in 2006. A detailed description of actions that have been taken under the TCRA is presented in the Final Removal Action Completion Report (TtECI 2007b). The TCRA completed at the metal debris reef is discussed in Section 4.3.11.1.1 as part of Redevelopment Block EOS-3, IR-02 Southeast.

4.3.14.2 *Geology and Hydrogeology of Parcel E Shoreline*

This section briefly discusses the geological and hydrogeological features beneath the Parcel E shoreline. A full description of geology and hydrogeology at Parcel E is presented in Sections 3.4 and 3.5, respectively.

The shallow geology consists of Artificial Fill, similar to the adjacent onshore areas. Aerial photographs indicated that filling of the Bay began in the late 1930s and that Artificial Fill was placed on native bay sediments. The Artificial Fill used to fill in the Bay may contain serpentinite bedrock, excavated Bay Mud, sands, gravels, construction debris, industrial debris, and sandblast waste (Tetra Tech, LFR, and U&A 1997).

Groundwater is present in the A-aquifer, B-aquifer, and bedrock water-bearing zone at Parcel E (Tetra Tech, LFR, and U&A 1997). The A-aquifer consists primarily of saturated Artificial Fill. Groundwater is present in the A-aquifer from 1 to 15 feet bgs, and water levels are generally higher during the wet season (winter and spring). Detailed information about groundwater in Parcel E is presented in the "Final Parcel E Groundwater Summary Report for the Phase III Groundwater Data Gaps Investigation" (Tetra Tech 2003b) and in Section 3.5.

4.3.14.3 Nature and Extent of Chemicals in Sediment

This section summarizes the evaluation of the nature and extent of chemicals in sediment at the Parcel E shoreline. Details of the evaluation of the nature and extent of chemicals in sediment along the shoreline are presented in Appendix G.

Figure 2-3 shows the locations where sediment samples were collected from the Parcel E shoreline. Tables 2 and 3 of Appendix G present the calibrated field data and laboratory data that were screened against sediment screening criteria. The primary objective of the screening criteria developed for the shoreline sediments was to delineate the release of chemicals resulting from site activities that could be a source of contamination to sediments in the adjacent Parcel F (offshore). Any shoreline area that exceeded the Bay ambient sediment concentrations was identified as a potential source area. Tables 4.3.14-1, 4.3.14-2, and 4.3.14-3 present the summary statistics for chemicals that were detected at concentrations exceeding screening criteria in Redevelopment Blocks EOS-1, EOS-2, and EOS-3.

Copper, lead, and PCBs were present at concentrations considered to be a potential source of contamination to Parcel F. Metals and total Aroclors were screened against sediment ambient concentrations for the Bay (Water Board 1998, 2003). Results of the screening process are described below.

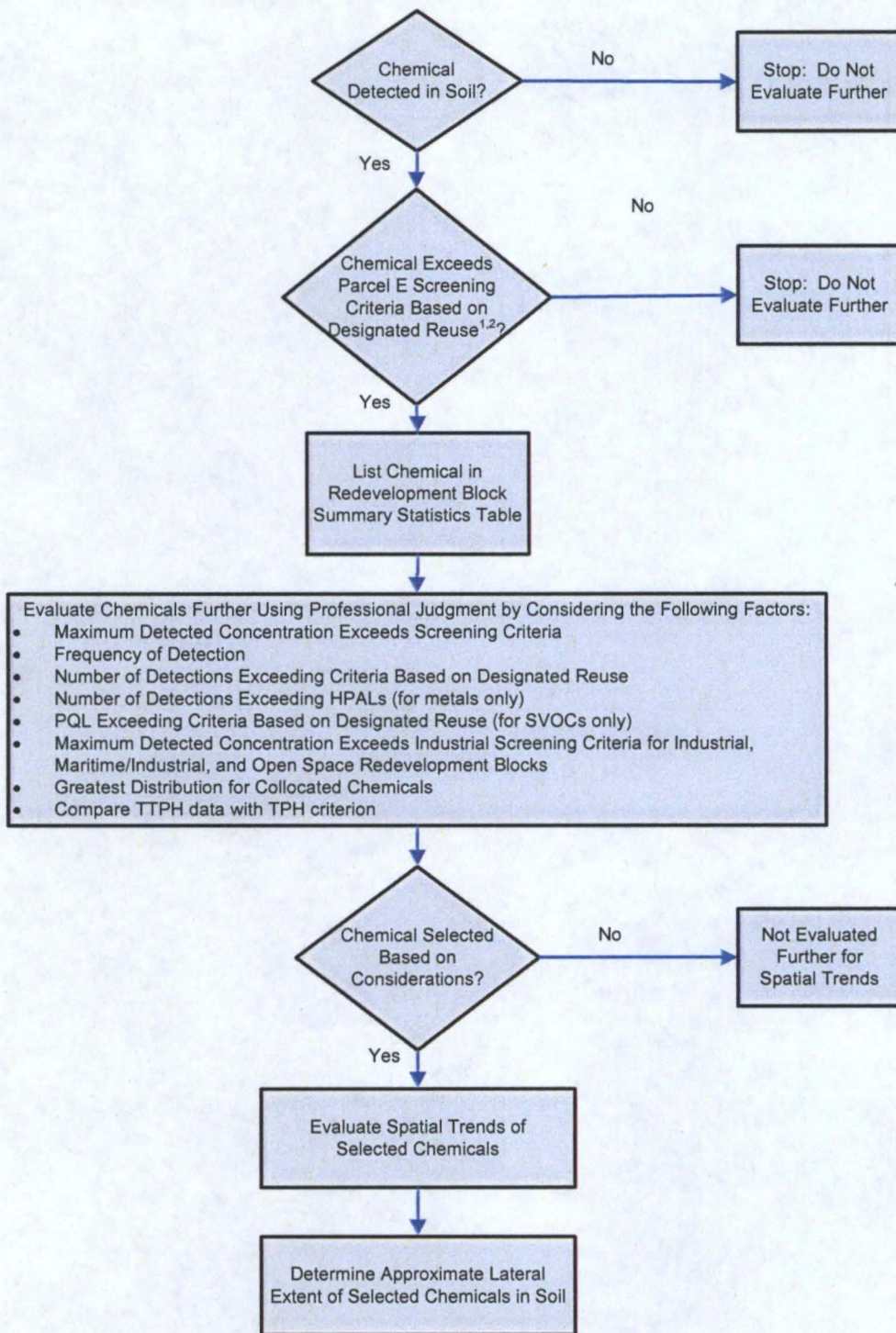
Metals

Metals concentrations at most locations along the shoreline exceeded ambient concentrations for bay sediments. Specifically, concentrations of copper and lead exceeded the ambient sediment concentrations (68.1 mg/kg for copper and 43.2 mg/kg for lead) (Water Board 1998) in all areas. The highest copper and lead concentrations in sediments were found in IR-02 Southeast. As a result, all locations along the Parcel E shoreline are considered to be a potential source of contamination to Parcel F.

Polychlorinated Biphenyls

Concentrations of PCBs exceeded the nearshore ambient concentration of 0.20 mg/kg (Water Board 2003) in most locations along the entire Parcel E shoreline. The highest PCB concentrations in sediments were found in IR-02 Southeast. As a result, the locations along the Parcel E shoreline are considered to be a potential source of contamination to Parcel F.

FIGURES



Notes:

1. Designated reuse are industrial or residential.
2. If no residential or industrial criterion exists for a chemical (such as calcium), then that chemical was not evaluated further.

The approach above only applies to the evaluation of nature and extent of chemicals in soil. All chemicals were included in the Human Health Risk Assessment (see Appendix I).

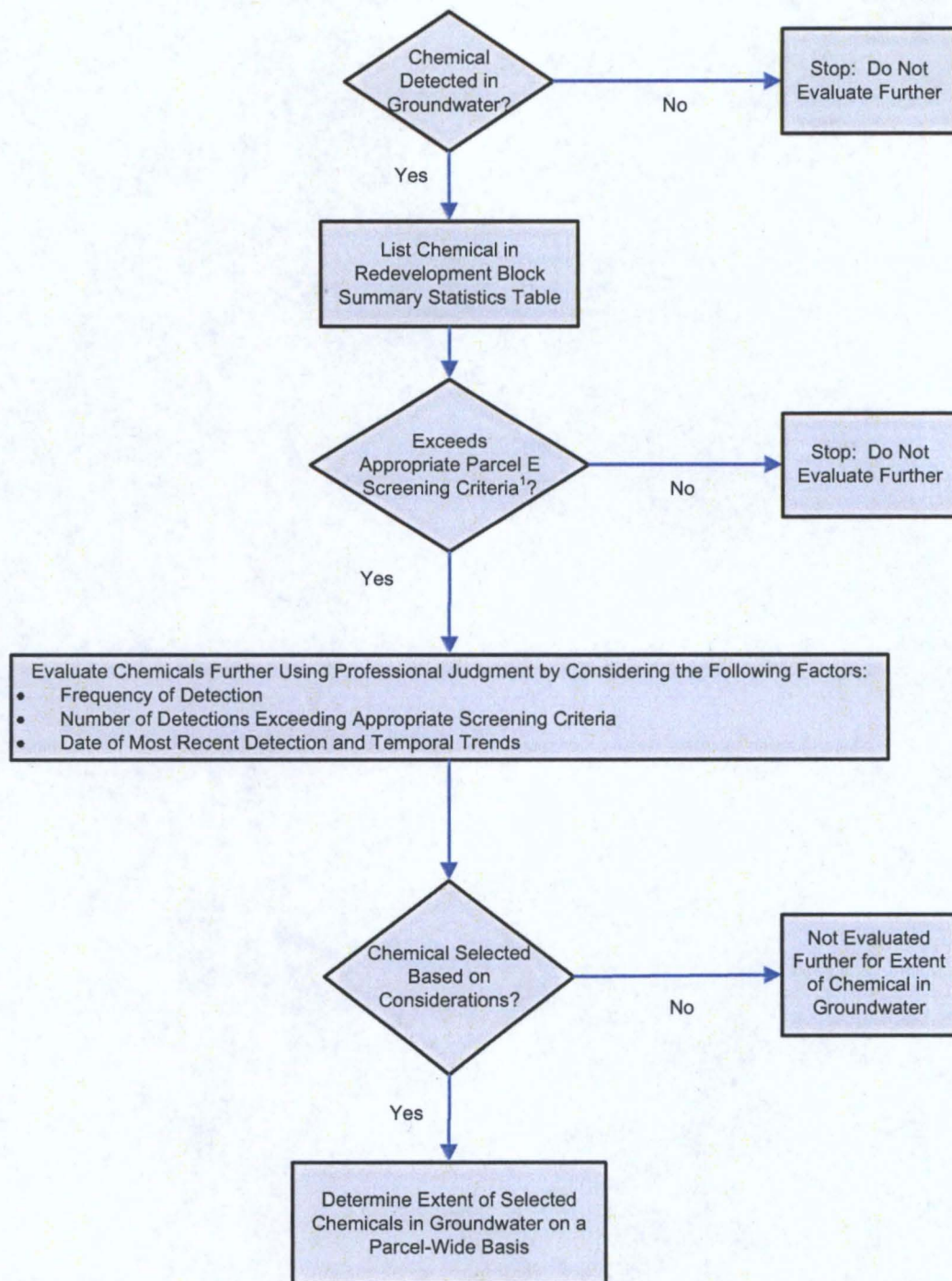


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FIGURE 4-1

**NATURE AND EXTENT APPROACH
FOR CHEMICALS IN SOIL**

Revised Remedial Investigation Report for Parcel E



Notes:

1. Parcel E screening criteria for A-aquifer:

- Human Health Criteria: Vapor intrusion criteria
- Ecological Criteria: Surface water criteria, or HGALs if higher than surface water criteria

Parcel E screening criteria for B-aquifer:

- Human Health Criteria: Domestic use criteria and MCLs, or HGALs if higher than other human health criteria
- Ecological Criteria: Surface water criteria, or HGALs if higher than surface water criteria

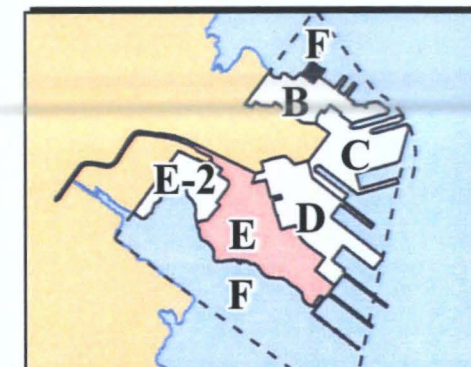
The approach above only applies to the evaluation of nature and extent of chemicals in groundwater. All chemicals were included in the Human Health Risk Assessment (see Appendix I).



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**FIGURE 4-2
NATURE AND EXTENT APPROACH
FOR CHEMICALS IN GROUNDWATER**

Revised Remedial Investigation Report for Parcel E



Metal Results in A-Aquifer

- Result Exceeding Screening Criteria
- Result Below Screening Criteria
- Nondetected Result Below Screening Criteria
- Copper Plume Contour of 28.04 µg/L
- Lead Plume Contour of 14.44 µg/L
- Nickel Plume Contour of 96.48 µg/L
- Zinc Plume Contour of 75.68 µg/L
- TPH Corrective Action Areas Completed in 2004
- Planned TPH Corrective Action Areas
- Triple A Site
- Parcel E Boundary
- Other HPS Parcels
- IR Site Boundary
- Existing Building
- Non-Navy Property

Parcel E Redevelopment Blocks

- Industrial
- Maritime-Industrial
- Mixed Use
- Open Space
- Research and Development

Notes:
 1) Results shown represent the maximum concentration of the last two quarters in the RI data set through December 2004 (see Section 4.1.2.3).
 2) IR-52, the railroad right-of-way, is not shown in its entirety in order to better display more detailed information for the remainder of Parcel E.
 3) Refer to Table 4-3 for a summary of metals detected at concentrations above criteria.

Chemical	Screening Criterion	Value (µg/L)
Copper	HGAL	28.04
Lead	HGAL	14.44
Nickel	HGAL	96.48
Zinc	HGAL	75.68

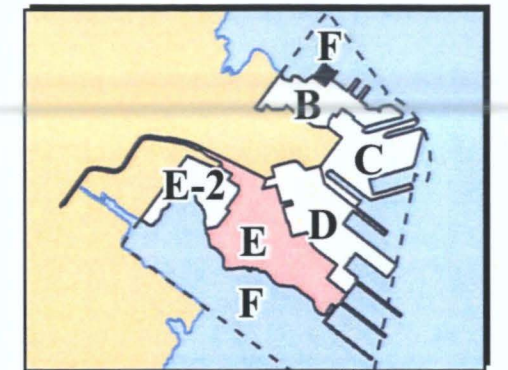
µg/L Microgram per liter
 HGAL Hunters point groundwater ambient level
 HPS Hunters Point Shipyard
 Installation Restoration
 TPH Total petroleum hydrocarbons

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FIGURE 4-3
SELECTED METAL CONCENTRATIONS
IN A-AQUIFER GROUNDWATER

Revised Remedial Investigation Report for Parcel E



VOC Results in A-Aquifer

- Result Exceeding Screening Criteria
- Result Below Screening Criteria
- Nondetected Result Exceeding Screening Criteria
- Nondetected Result Below Screening Criteria
- 1,1-Dichloroethane Plume Contour of 6.5 µg/L
- Tetrachloroethene Plume Contour of 0.54 µg/L
- Trichloroethene Plume Contour of 2.88 µg/L
- Benzene Plume Contour of 0.37 µg/L
- TPH Corrective Action Areas Completed in 2004
- Planned TPH Corrective Action Areas
- Triple A Site
- Parcel E Boundary
- Other HPS Parcels
- IR Site Boundary
- Existing Building
- Non-Navy Property

Parcel E Redevelopment Blocks

- Industrial
- Maritime-Industrial
- Mixed Use
- Open Space
- Research and Development

Notes:
1) Results shown represent the maximum concentration of the last two quarters in the RI data set through December 2004 (see Section 4.1.2.3).
2) R-52, the railroad right-of-way, is not shown in its entirety in order to better display more detailed information for the remainder of Parcel E.
3) Refer to Table 4-4 for a summary of VOCs detected at concentrations above criteria.

Chemical	Screening Criterion	Value (µg/L)
1,1-Dichloroethane	Residential Screening Criterion	6.5
Benzene	Residential Screening Criterion	0.37
Chloroform	Residential Screening Criterion	0.7
Naphthalene	Residential Screening Criterion	3.6
Tetrachloroethene	Residential Screening Criterion	0.54
Trichloroethene	Residential Screening Criterion	2.88

µg/L Microgram per liter
HPS Hunters Point Shipyard
IR Installation Restoration
TPH Total petroleum hydrocarbon
VOC Volatile organic chemical



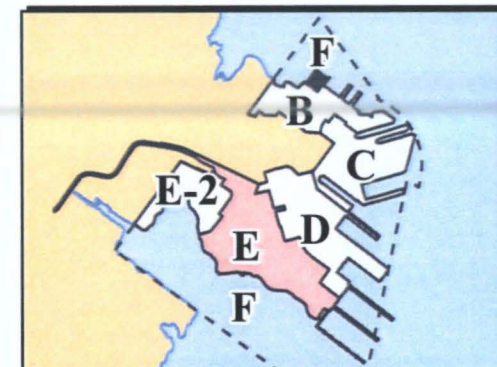
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FIGURE 4-4

SELECTED VOC CONCENTRATIONS IN A-AQUIFER GROUNDWATER

Revised Remedial Investigation Report for Parcel E



Pesticide and PCB Results in A-Aquifer

- Result Exceeding Screening Criteria
- Result Below Screening Criteria
- Nondetected Result Exceeding Screening Criteria
- Aroclor-1254 Plume Contour of 0.03 µg/L
- TPH Corrective Action Areas Completed in 2004
- Planned TPH Corrective Action Areas
- Triple A Site
- Parcel E Boundary
- Other HPS Parcels
- IR Site Boundary
- Existing Building
- Non-Navy Property

Parcel E Redevelopment Blocks

- Industrial
- Maritime-Industrial
- Mixed Use
- Open Space
- Research and Development

Notes:
1) Results shown represent the maximum concentration of the last two quarters in the RI data set through December 2004 (see section 4.1.2.3).
2) IR-52, the railroad right-of-way, is not shown in its entirety in order to better display more detailed information for the remainder of Parcel E.
3) Refer to Table 4-5 for a summary of selected pesticides and PCBs detected at concentrations above criteria.

Chemical	Screening Criterion	Value (µg/L)
Aroclor-1254	Surface Water Criterion	0.03
Gamma Chlordane	Surface Water Criterion	0.004
Heptachlor Epoxide	Surface Water Criterion	0.0036

µg/L Microgram per liter
HPS Hunters Point Shipyard
IR Installation Restoration
PCB Polychlorinated biphenyl
TPH Total petroleum hydrocarbon



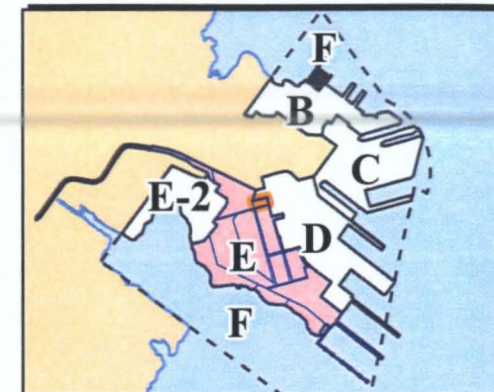
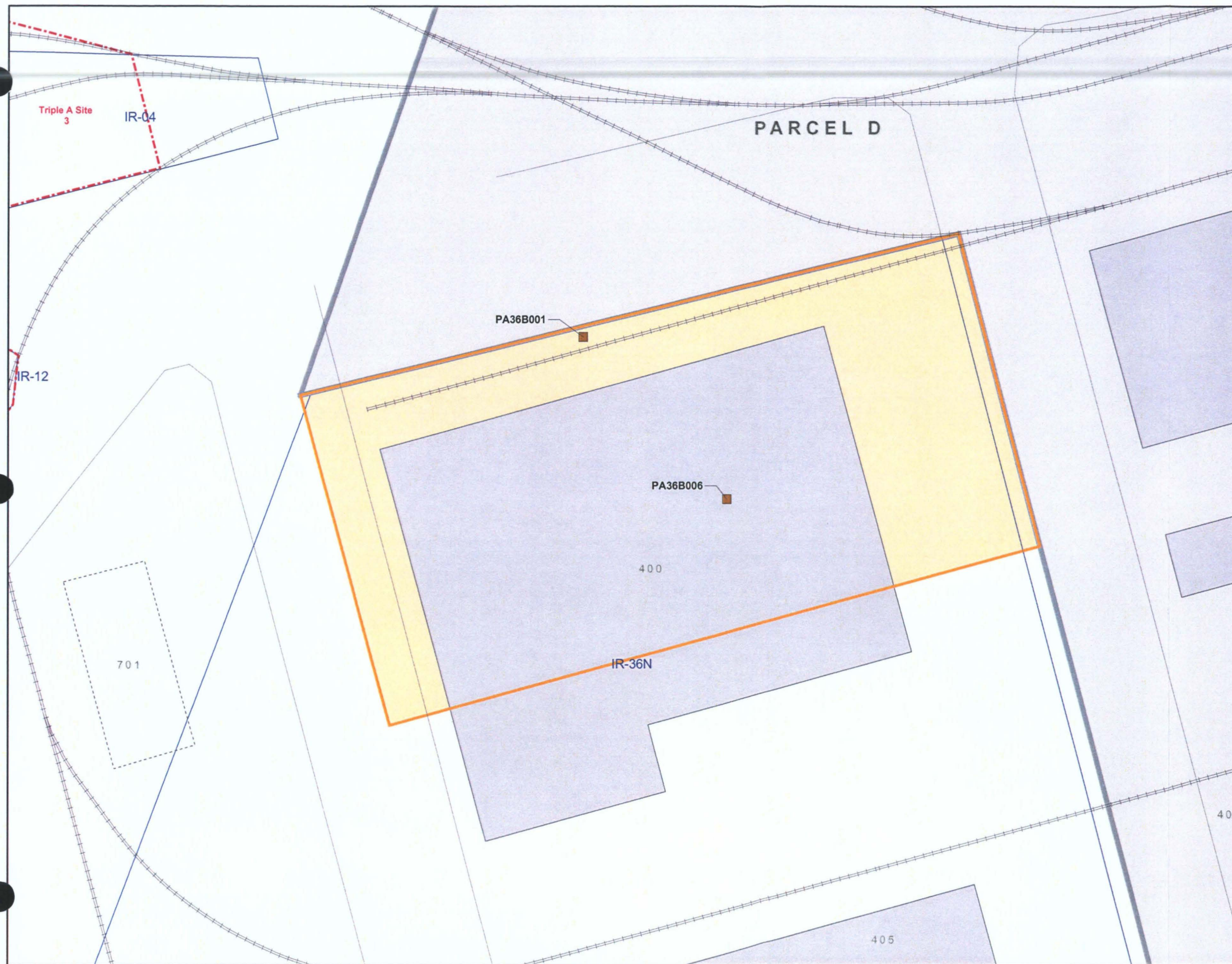
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FIGURE 4-5

SELECTED PESTICIDE AND PCB CONCENTRATIONS IN A-AQUIFER GROUNDWATER

Revised Remedial Investigation Report for Parcel E



- Soil Sampling Locations 0 to 10 feet bgs
- ▭ Redevelopment Block 31A Boundary
- ▭ IR Site Boundary
- ▭ Other HPS Parcels
- ▭ Triple A Site
- ▭ Existing Building
- ▭ Demolished Building
- Rail Line
- Road

Notes:

bgs Below ground surface
HPS Hunters Point Shipyard
IR Installation Restoration



50 0 50
Scale in Feet

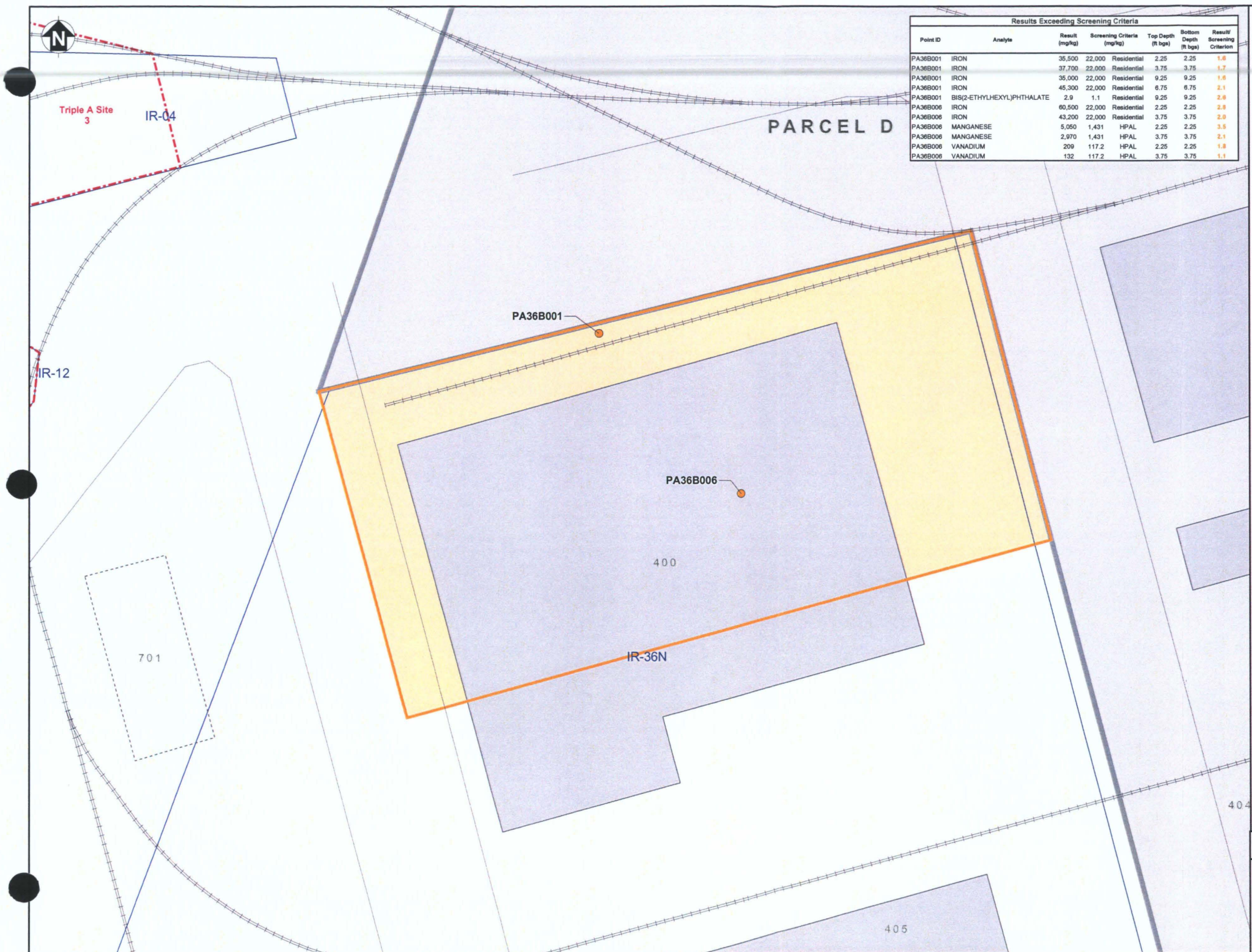
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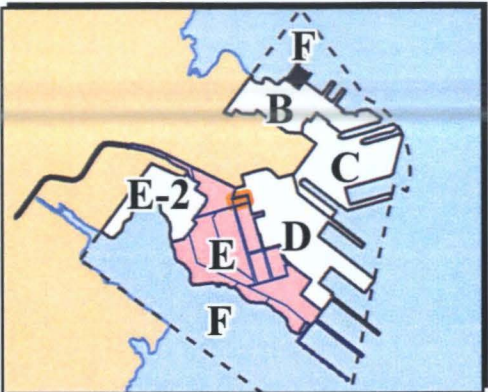
FIGURE 4.3.1-1

**SOIL SAMPLING LOCATIONS
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK 31A**

Revised Remedial Investigation Report for Parcel E



Results Exceeding Screening Criteria						
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion
PA36B001	IRON	35,500	22,000 Residential	2.25	2.25	1.6
PA36B001	IRON	37,700	22,000 Residential	3.75	3.75	1.7
PA36B001	IRON	35,000	22,000 Residential	9.25	9.25	1.6
PA36B001	IRON	45,300	22,000 Residential	6.75	6.75	2.1
PA36B001	BIS(2-ETHYLHEXYL)PHTHALATE	2.9	1.1 Residential	9.25	9.25	2.6
PA36B006	IRON	60,500	22,000 Residential	2.25	2.25	2.8
PA36B006	IRON	43,200	22,000 Residential	3.75	3.75	2.0
PA36B006	MANGANESE	5,050	1,431 HPAL	2.25	2.25	3.5
PA36B006	MANGANESE	2,970	1,431 HPAL	3.75	3.75	2.1
PA36B006	VANADIUM	209	117.2 HPAL	2.25	2.25	1.8
PA36B006	VANADIUM	132	117.2 HPAL	3.75	3.75	1.1

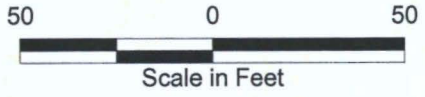


Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- Redevelopment Block 31A Boundary
- IR Site Boundary
- Other HPS Parcels
- Triple A Site
- Existing Building
- Demolished Building
- Rail Line
- Road

Notes:

- bgs Below ground surface
- ft Feet
- HPS Hunters Point Shipyard
- IR Installation Restoration



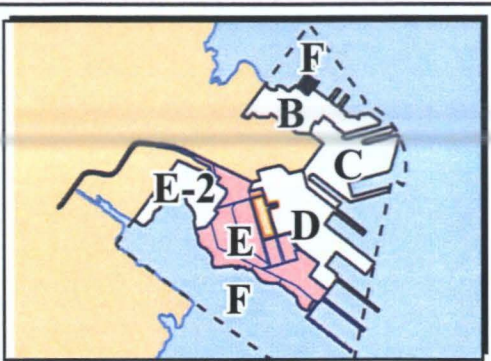
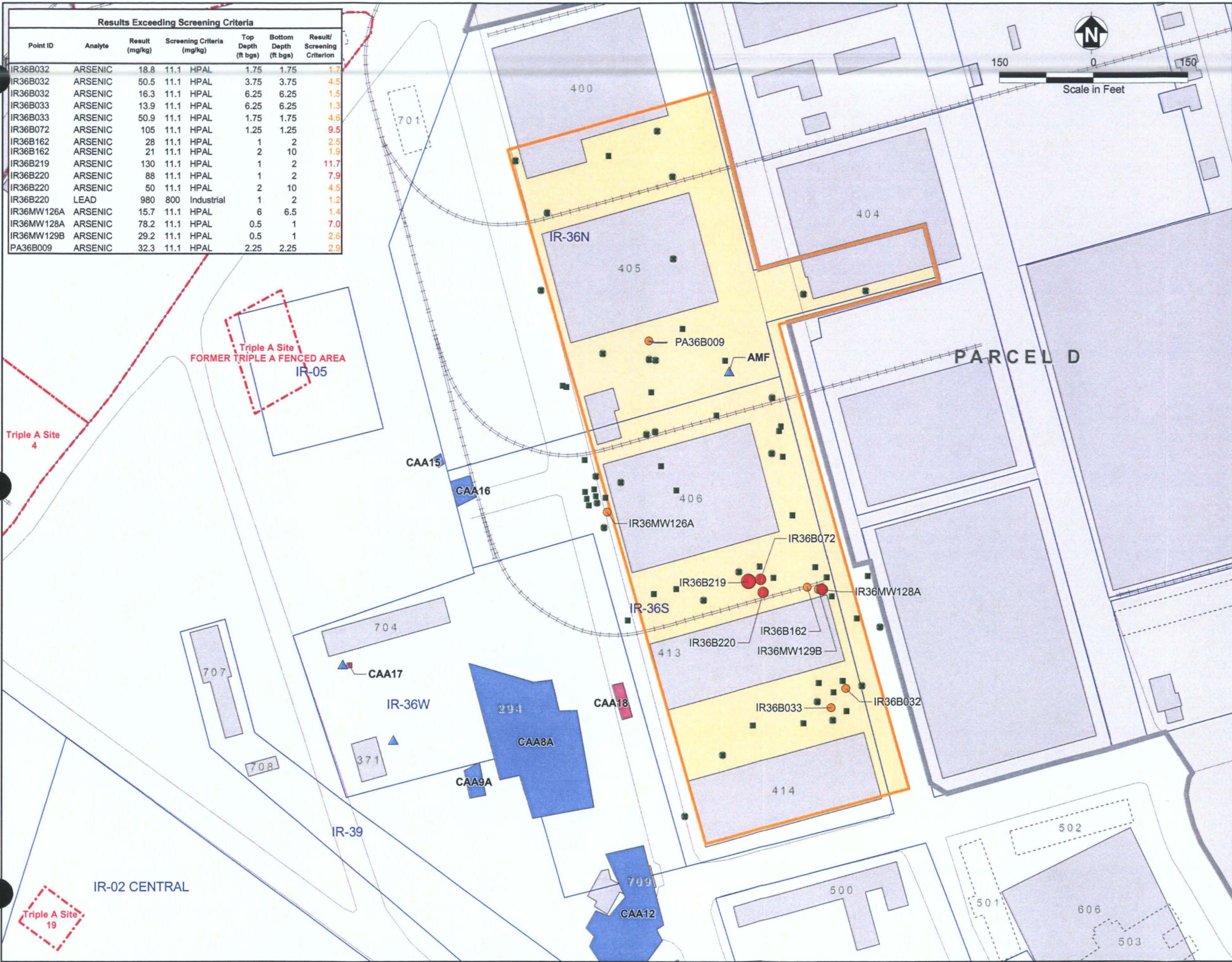
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FIGURE 4.3.1-2

**METALS AND SVOC CONCENTRATIONS
IN SOIL (0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK 31A**
Revised Remedial Investigation Report for Parcel E

Results Exceeding Screening Criteria							
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion	
IR36B032	ARSENIC	18.8	11.1 HPAL	1.75	1.75	1.7	
IR36B032	ARSENIC	50.5	11.1 HPAL	3.75	3.75	4.5	
IR36B032	ARSENIC	16.3	11.1 HPAL	6.25	6.25	1.5	
IR36B033	ARSENIC	13.9	11.1 HPAL	6.25	6.25	1.3	
IR36B033	ARSENIC	50.9	11.1 HPAL	1.75	1.75	4.6	
IR36B072	ARSENIC	105	11.1 HPAL	1.25	1.25	9.5	
IR36B162	ARSENIC	28	11.1 HPAL	1	2	2.5	
IR36B162	ARSENIC	21	11.1 HPAL	2	10	1.9	
IR36B219	ARSENIC	130	11.1 HPAL	1	2	11.7	
IR36B220	ARSENIC	88	11.1 HPAL	1	2	7.9	
IR36B220	ARSENIC	50	11.1 HPAL	2	10	4.5	
IR36B220	LEAD	980	800 Industrial	1	2	1.2	
IR36MW126A	ARSENIC	15.7	11.1 HPAL	6	6.5	1.4	
IR36MW128A	ARSENIC	78.2	11.1 HPAL	0.5	1	7.0	
IR36MW129B	ARSENIC	29.2	11.1 HPAL	0.5	1	2.6	
PA36B009	ARSENIC	32.3	11.1 HPAL	2.25	2.25	2.9	



Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- ▲ Removed AST
- ▭ Redevelopment Block 31B/36 Boundary
- ▭ IR Site Boundary
- ▭ Other HPS Parcels
- ▭ Existing Building
- ▭ Demolished Building
- ▭ Triple A Site
- ▭ TPH Corrective Action Areas Completed in 2004
- ▭ Planned TPH Corrective Action Areas
- ▭ Rail Line
- ▭ Road

Notes:
See Appendix C tables for summary of all soil results.

AST Aboveground storage tank
bgs Below ground surface
ft feet
HPAL Hunters Point ambient level
HPS Hunters Point Shipyard
IR Installation Restoration
mg/kg Milligram per kilogram
TPH Total petroleum hydrocarbon

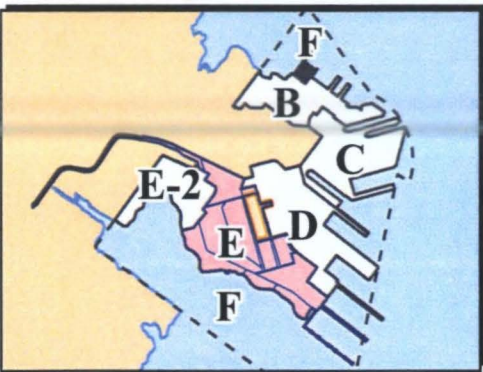
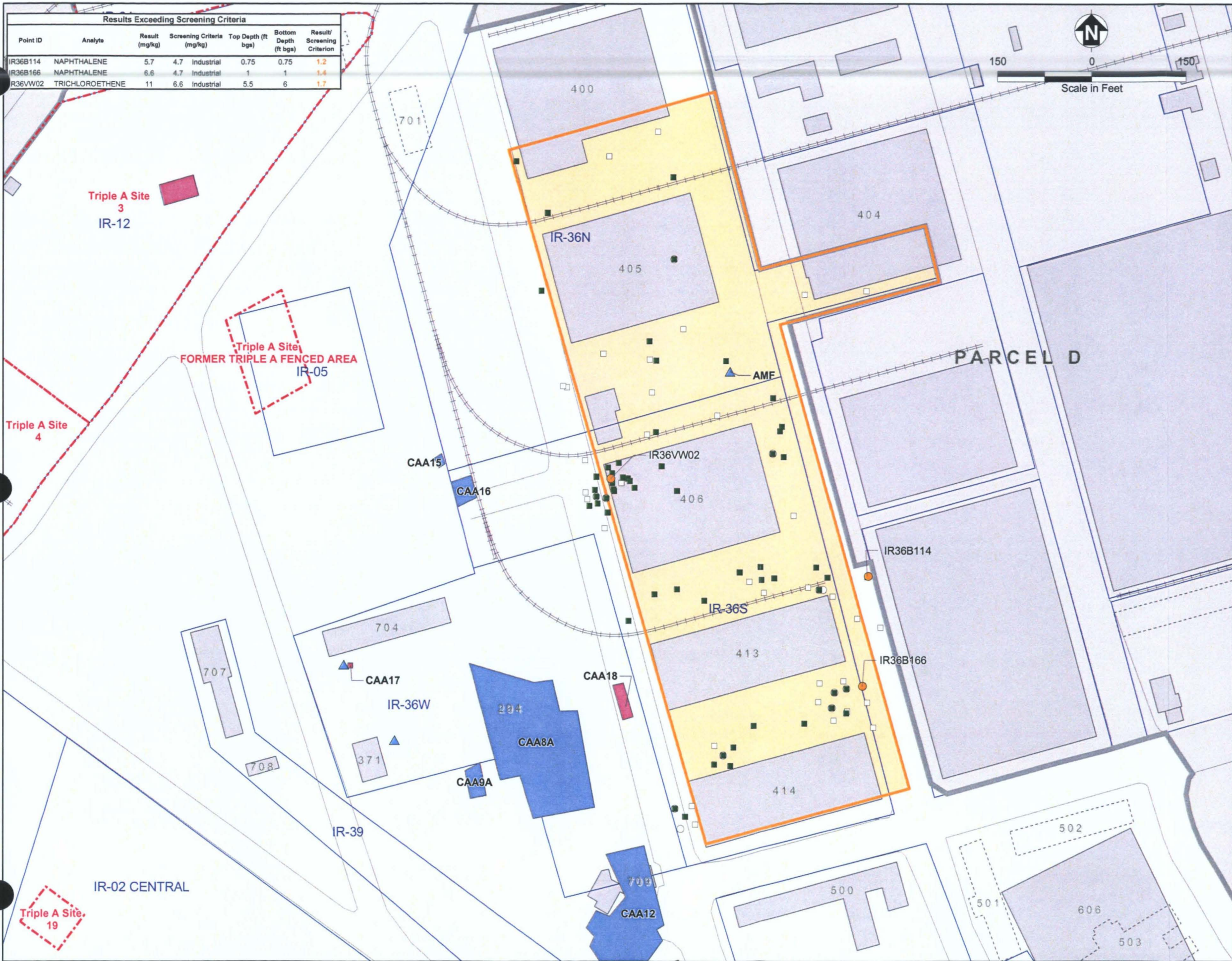
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U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 4.3.2-2

**METALS CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK 31B/36
Revised Remedial Investigation Report for Parcel E**

Results Exceeding Screening Criteria						
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion
IR36B114	NAPHTHALENE	5.7	4.7 Industrial	0.75	0.75	1.2
IR36B166	NAPHTHALENE	6.6	4.7 Industrial	1	1	1.4
IR36VW02	TRICHLOROETHENE	11	6.6 Industrial	5.5	6	1.7



Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- ▲ Removed AST
- ▭ Redevelopment Block 31B/36 Boundary
- ▭ IR Site Boundary
- ▭ Other HPS Parcels
- ▭ Existing Building
- ▭ Demolished Building
- ▭ Triple A Site
- ▭ TPH Corrective Action Areas Completed in 2004
- ▭ Planned TPH Corrective Action Areas
- Rail Line
- Road

Notes:
See Appendix C tables for summary of all soil results.

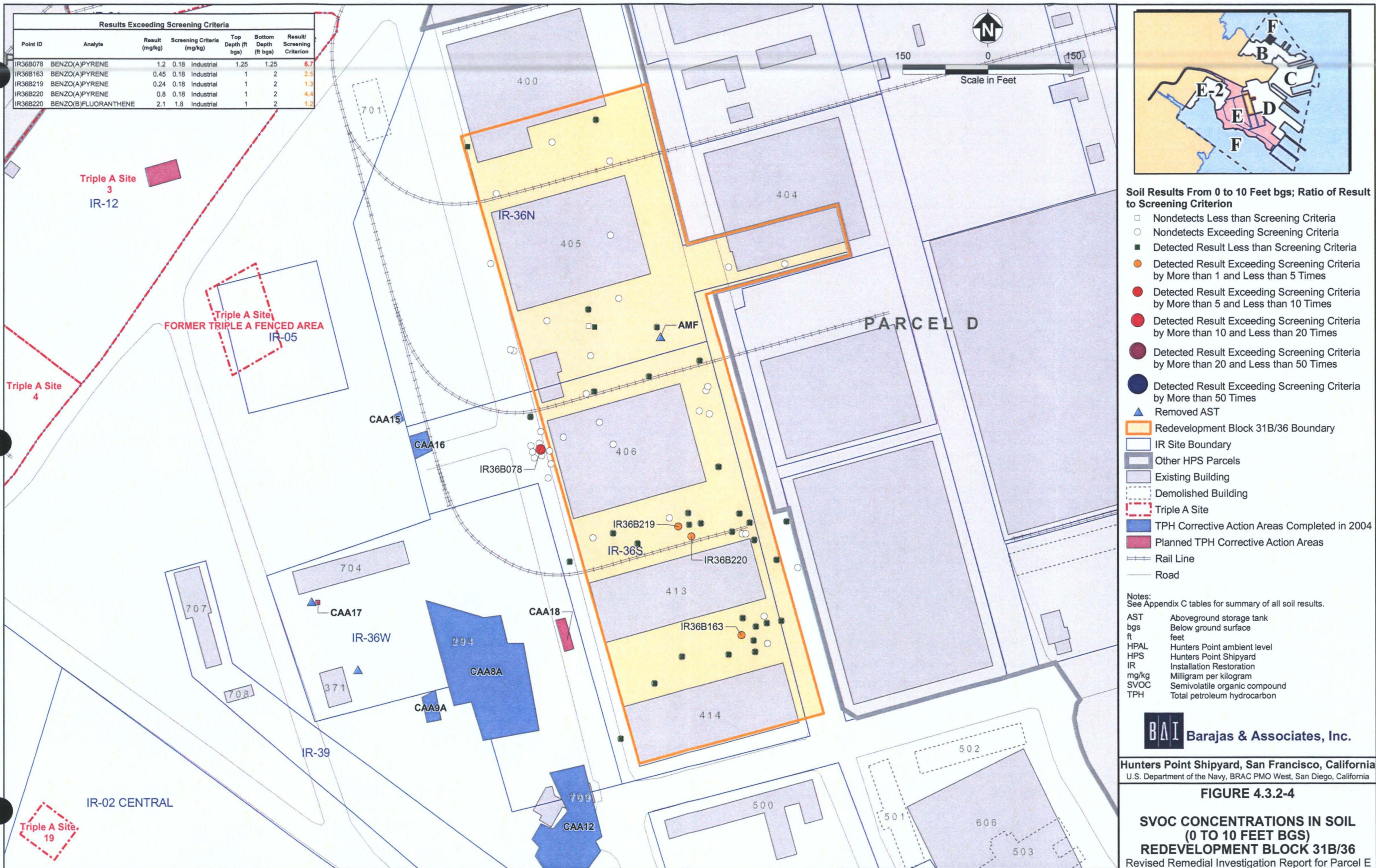
AST Aboveground storage tank
bgs Below ground surface
ft feet
HPAL Hunters Point ambient level
HPS Hunters Point Shipyard
IR Installation Restoration
mg/kg Milligram per kilogram
VOC Volatile organic compound
TPH Total petroleum hydrocarbon

BAI Barajas & Associates, Inc.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 4.3.2-3

**VOC CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK 31B/36
Revised Remedial Investigation Report for Parcel E**



Results Exceeding Screening Criteria							
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion	
IR36B078	BENZO(A)PYRENE	1.2	0.18 Industrial	1.25	1.25	6.7	
IR36B163	BENZO(A)PYRENE	0.45	0.18 Industrial	1	2	2.5	
IR36B219	BENZO(A)PYRENE	0.24	0.18 Industrial	1	2	1.3	
IR36B220	BENZO(A)PYRENE	0.8	0.18 Industrial	1	2	4.4	
IR36B220	BENZO(B)FLUORANTHENE	2.1	1.8 Industrial	1	2	1.2	

Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- ▲ Removed AST
- Red outline: Redevelopment Block 31B/36 Boundary
- Blue outline: IR Site Boundary
- Grey outline: Other HPS Parcels
- Light blue fill: Existing Building
- White fill: Demolished Building
- Red dashed outline: Triple A Site
- Blue fill: TPH Corrective Action Areas Completed in 2004
- Pink fill: Planned TPH Corrective Action Areas
- Black line: Rail Line
- Grey line: Road

Notes:
See Appendix C tables for summary of all soil results.

AST Aboveground storage tank
bgs Below ground surface
ft feet
HPAL Hunters Point ambient level
HPS Hunters Point Shipyard
IR Installation Restoration
mg/kg Milligram per kilogram
SVOC Semivolatile organic compound
TPH Total petroleum hydrocarbon

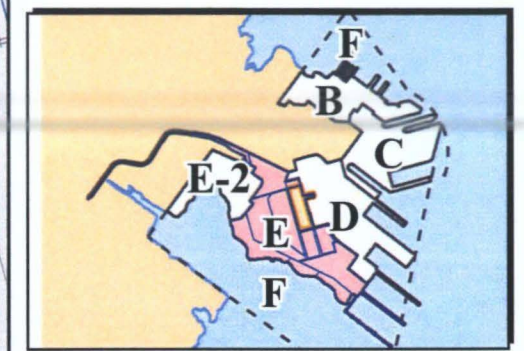
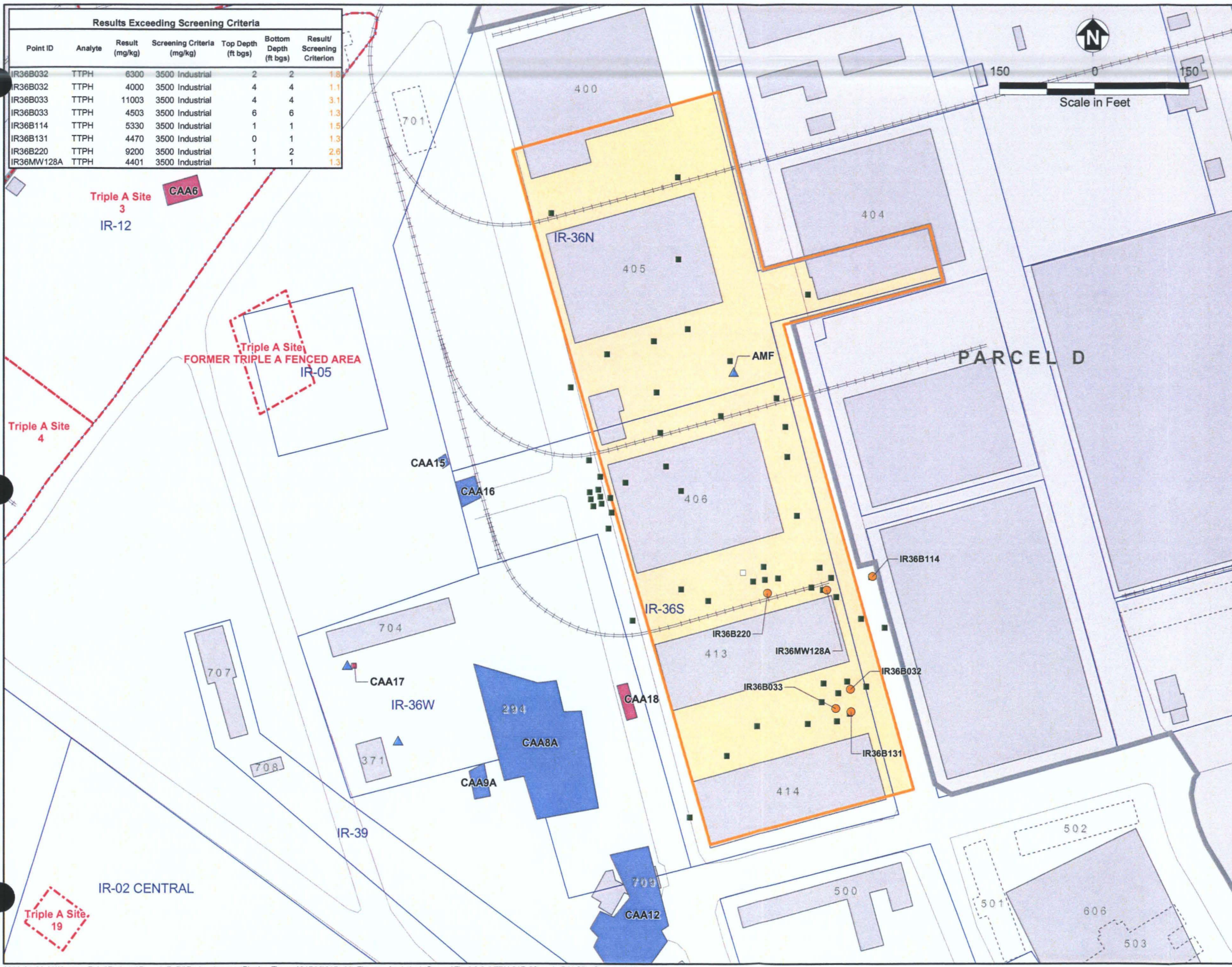
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FIGURE 4.3.2-4

**SVOC CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK 31B/36**
Revised Remedial Investigation Report for Parcel E

Results Exceeding Screening Criteria						
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion
IR36B032	TTPH	6300	3500 Industrial	2	2	1.8
IR36B032	TTPH	4000	3500 Industrial	4	4	1.1
IR36B033	TTPH	11003	3500 Industrial	4	4	3.1
IR36B033	TTPH	4503	3500 Industrial	6	6	1.3
IR36B114	TTPH	5330	3500 Industrial	1	1	1.5
IR36B131	TTPH	4470	3500 Industrial	0	1	1.3
IR36B220	TTPH	9200	3500 Industrial	1	2	2.6
IR36MW128A	TTPH	4401	3500 Industrial	1	1	1.3



Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- ▲ Removed AST
- ▭ Redevelopment Block 31B/36 Boundary
- ▭ IR Site Boundary
- ▭ Other HPS Parcels
- ▭ Existing Building
- ▭ Demolished Building
- ▭ Triple A Site
- ▭ TPH Corrective Action Areas Completed in 2004
- ▭ Planned TPH Corrective Action Areas
- Rail Line
- Road

Notes:
See Appendix C tables for summary of all results.

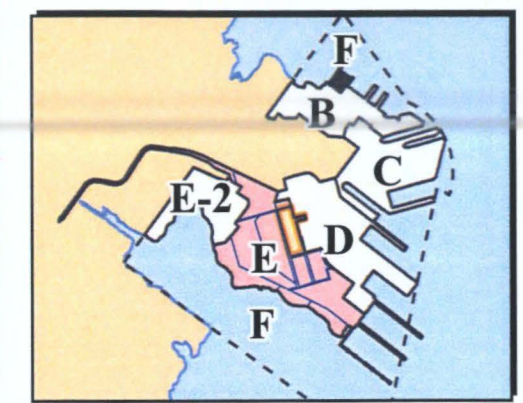
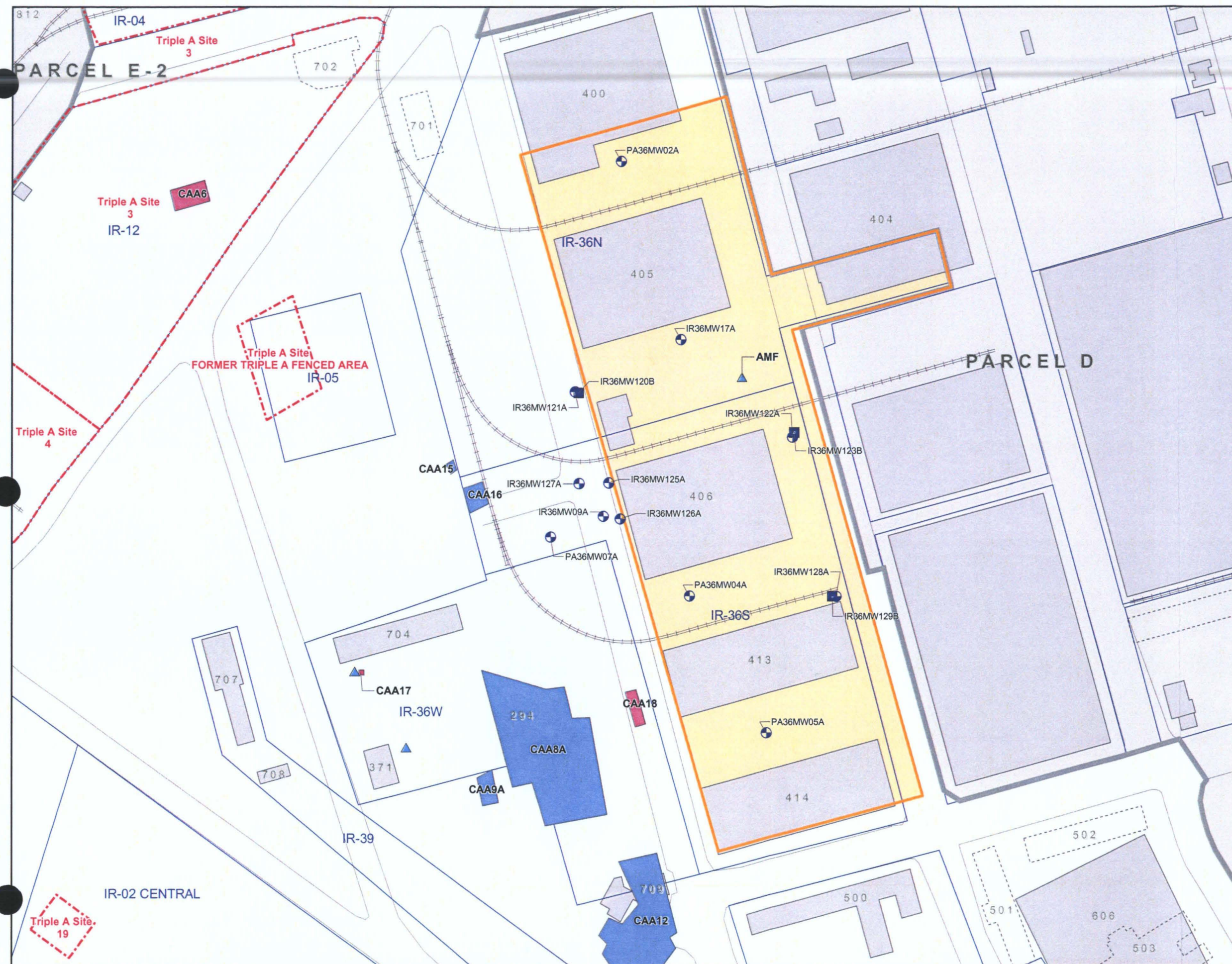
AST Aboveground storage tank
bgs Below ground surface
ft feet
HPS Hunters Point Shipyard
IR Installation Restoration
mg/kg Milligram per kilogram
TPH Total petroleum hydrocarbon
TTPH Total total petroleum hydrocarbon

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Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 4.3.2-5

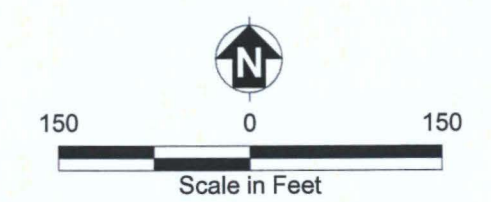
**TPH CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS),
REDEVELOPMENT BLOCK 31B/36**
Revised Remedial Investigation Report for Parcel E



- Groundwater Sampling Locations in A- and B-Aquifers**
- Monitoring Well in A-Aquifer
 - Monitoring Well in B-Aquifer
 - Removed AST
 - Redevelopment Block 31B/36 Boundary
 - IR Site Boundary
 - Other HPS Parcels
 - Existing Building
 - Demolished Building
 - Triple A Site
 - TPH Corrective Action Areas Completed in 2004
 - Planned TPH Corrective Action Areas
 - Rail Line
 - Road

Notes:

AST Aboveground storage tank
 bgs Below ground surface
 HPS Hunters Point Shipyard
 IR Installation Restoration
 mg/kg Milligram per kilogram
 TPH Total petroleum hydrocarbon



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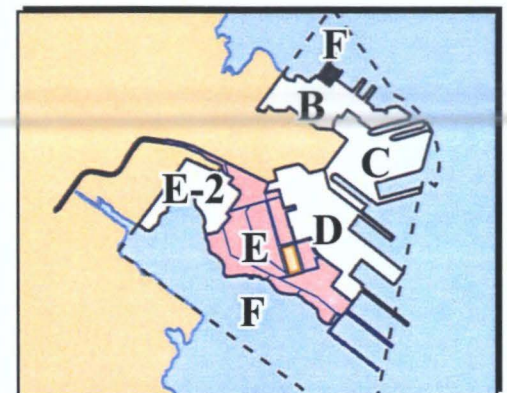
Hunters Point Shipyard, San Francisco, California
 U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 4.3.2-6
GROUNDWATER SAMPLING LOCATIONS
IN A- AND B- AQUIFERS
REDEVELOPMENT BLOCK 31B/36
 Revised Remedial Investigation Report for Parcel E





Results Exceeding Screening Criteria						
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion
IR14B052	ARSENIC	18	11.1 HPAL	2	10	1.6
PA38SS01	ARSENIC	12.3	11.1 HPAL	0	0	1.1



Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- Removed UST
- ▭ Redevelopment Block 40 Boundary
- ▭ IR Site Boundary
- ▭ Triple A Site
- ▭ TPH Corrective Action Areas Completed in 2004
- ▭ Existing Building
- ▭ Demolished Building
- Road

Notes:
Soil borings shown on this figure are included in the data set for Redevelopment Block 40 based on the boundaries of the HHRA grids associated with Redevelopment Block 40.

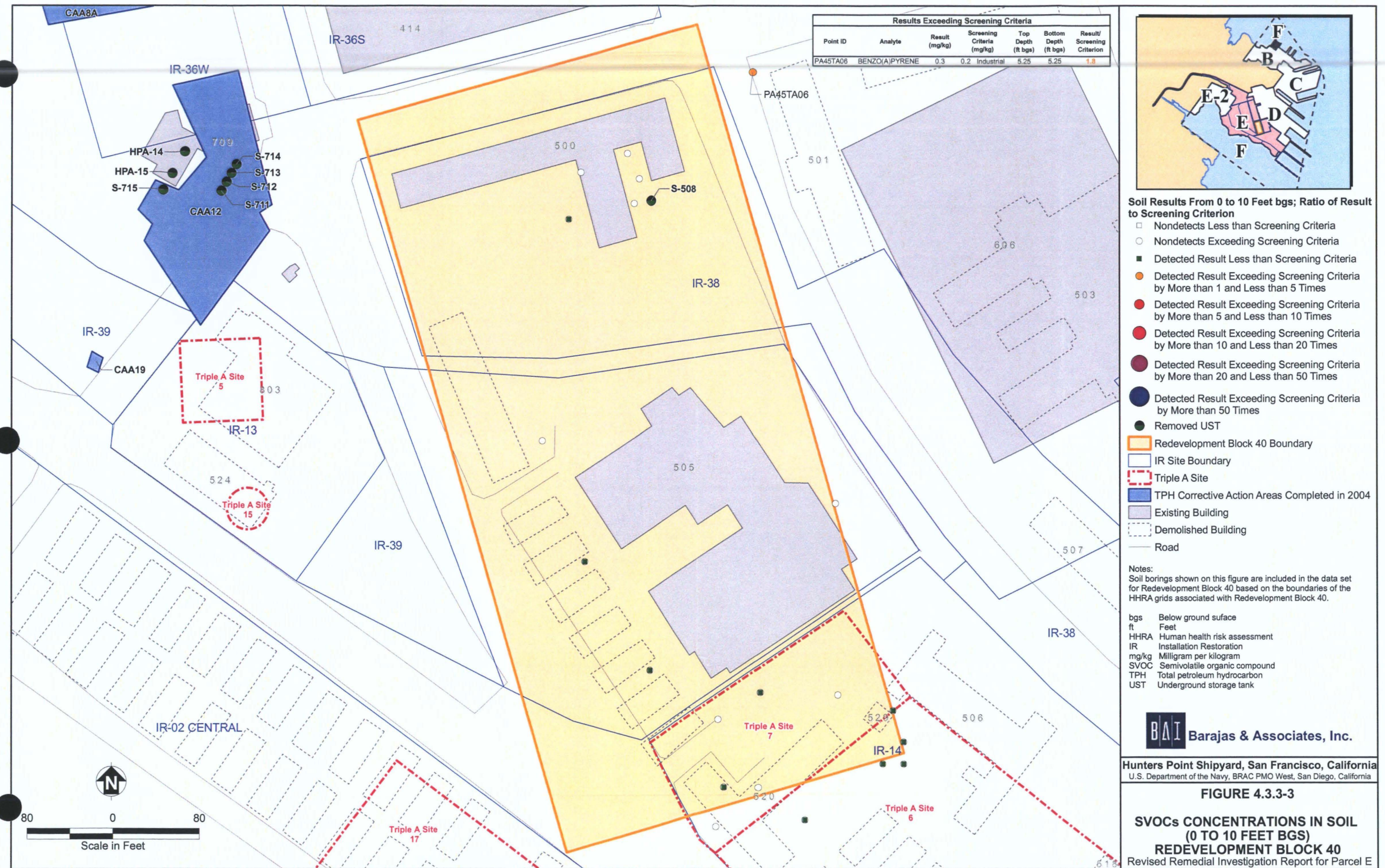
bgs Below ground surface
ft Feet
HHRA Human health risk assessment
HPAL Hunters Point ambient level
IR Installation Restoration
mg/kg Milligram per kilogram
TPH Total petroleum hydrocarbon
UST Underground storage tank

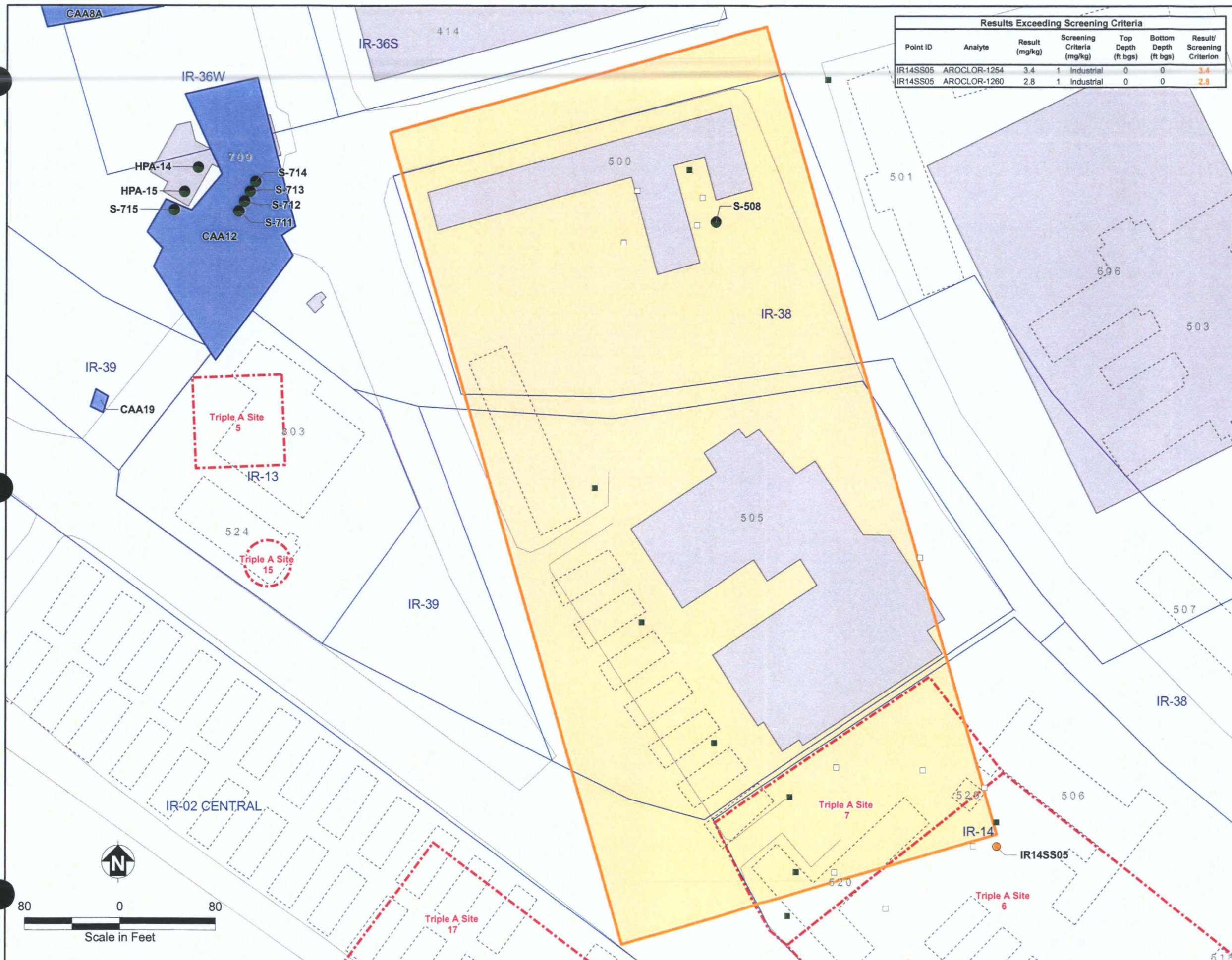
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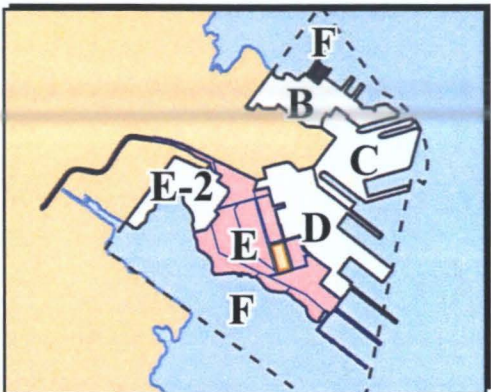
FIGURE 4.3.3-2

**METALS CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK 40**
Revised Remedial Investigation Report for Parcel E





Results Exceeding Screening Criteria						
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion
IR14SS05	AROCOR-1254	3.4	1 Industrial	0	0	3.4
IR14SS05	AROCOR-1260	2.8	1 Industrial	0	0	2.8



Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- Removed UST
- Red outline: Redevelopment Block 40 Boundary
- Blue outline: IR Site Boundary
- Red dashed outline: Triple A Site
- Blue shaded area: TPH Corrective Action Areas Completed in 2004
- Grey shaded area: Existing Building
- White dashed outline: Demolished Building
- Black line: Road

Notes:
Soil borings shown on this figure are included in the data set for Redevelopment Block 40 based on the boundaries of the HHRA grids associated with Redevelopment Block 40.

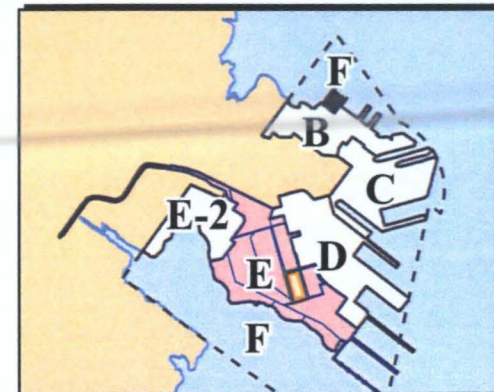
bgs Below ground surface
ft Feet
HHRA Human health risk assessment
IR Installation Restoration
mg/kg Milligram per kilogram
TPH Total petroleum hydrocarbon
UST Underground storage tank

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U.S. Department of the Navy, BRAC PMO West, San Diego, California

**FIGURE 4.3.3-4
PESTICIDE
CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK 40**

Revised Remedial Investigation Report for Parcel E



Groundwater Sampling Locations in A-Aquifer

- Monitoring Well in A-Aquifer
- Removed UST
- Redevelopment Block 40 Boundary
- IR Site Boundary
- Triple A Site
- TPH Corrective Action Areas Completed in 2004
- Existing Building
- Demolished Building
- Road

Notes:

- IR Installation Restoration
- TPH Total petroleum hydrocarbon
- UST Underground storage tank



80 0 80
Scale in Feet

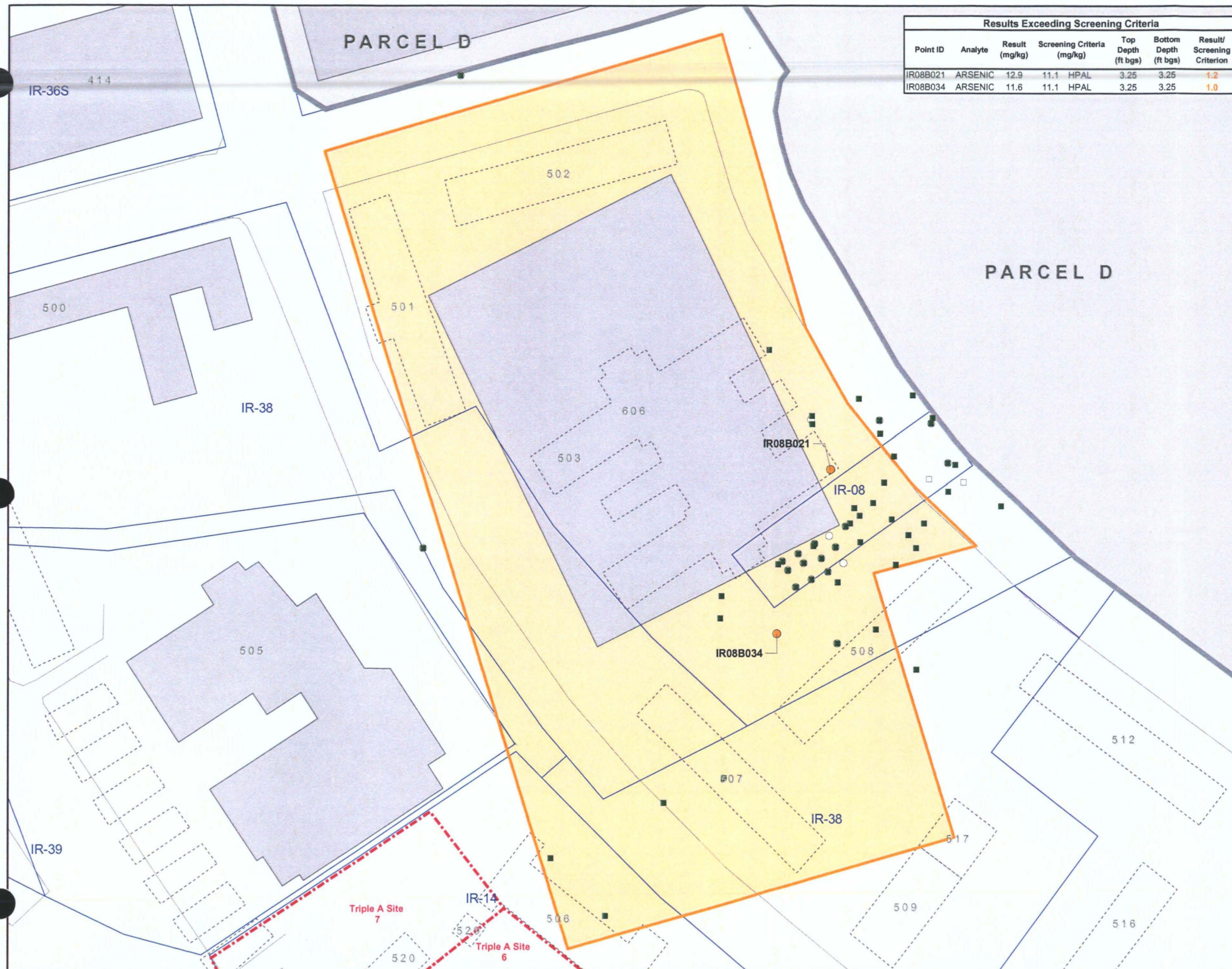
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U.S. Department of the Navy, BRAC PMO West, San Diego, California

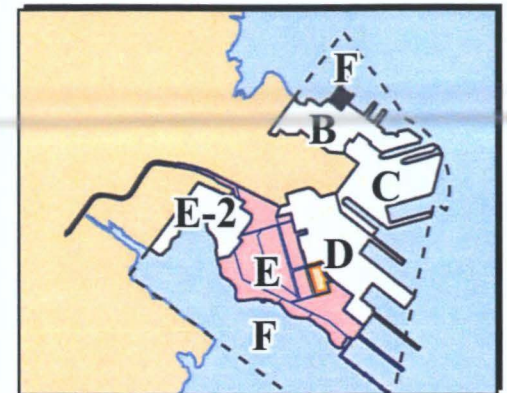
FIGURE 4.3.3-5

GROUNDWATER SAMPLING LOCATIONS IN A-AQUIFER AT REDEVELOPMENT BLOCK 40

Revised Remedial Investigation Report for Parcel E



Results Exceeding Screening Criteria						
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion
IR08B021	ARSENIC	12.9	11.1 HPAL	3.25	3.25	1.2
IR08B034	ARSENIC	11.6	11.1 HPAL	3.25	3.25	1.0

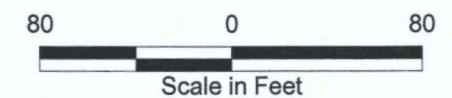


Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- ▭ Redevelopment Block 41 Boundary
- ▭ IR Site Boundary
- ▭ Other HPS Parcels
- ▭ Triple A Site
- ▭ Existing Building
- ▭ Demolished Building
- Road

Notes:

bgs Below ground surface
 ft Feet
 HPS Hunters Point Shipyard
 IR Installation Restoration
 mg/kg Milligram per kilogram



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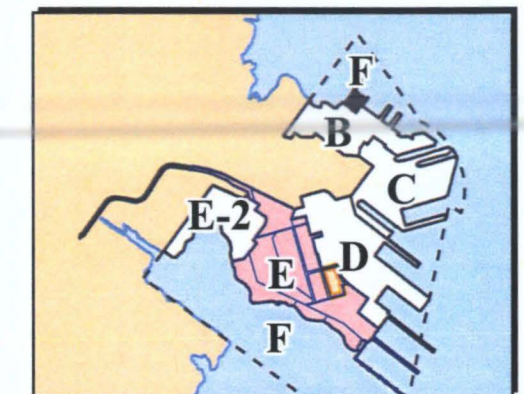
FIGURE 4.3.4-2

**METALS CONCENTRATIONS IN SOIL
 (0 TO 10 FEET BGS)
 REDEVELOPMENT BLOCK 41**

Revised Remedial Investigation Report for Parcel E



Results Exceeding Screening Criteria						
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion
IR08B013	BENZO(A)PYRENE	0.2	0.2 Industrial	1.75	1.75	1.3



Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- ▭ Redevelopment Block 41 Boundary
- ▭ IR Site Boundary
- ▭ Other HPS Parcels
- ▭ Triple A Site
- ▭ Existing Building
- ▭ Demolished Building
- Road

Notes:

bgs Below ground surface
ft Feet
HPS Hunters Point Shipyard
IR Installation Restoration
mg/kg Milligram per kilogram
SVOC Semivolatile organic compound



80 0 80
Scale in Feet

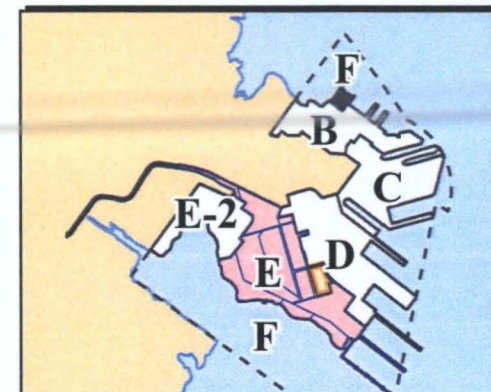
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U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 4.3.4-3

SVOC CONCENTRATIONS IN SOIL (0 TO 10 FEET BGS) REDEVELOPMENT BLOCK 41

Revised Remedial Investigation Report for Parcel E



Groundwater Sampling Locations in A-Aquifer

- Monitoring Well in A-Aquifer
- ⊗ Decommissioned Monitoring Well in A-Aquifer
- Redevelopment Block 41 Boundary
- IR Site Boundary
- Other HPS Parcels
- Triple A Site
- Existing Building
- Demolished Building
- Road

Notes:

HPS Hunters Point Shipyard
IR Installation Restoration



80 0 80
Scale in Feet

BAI Barajas & Associates, Inc.

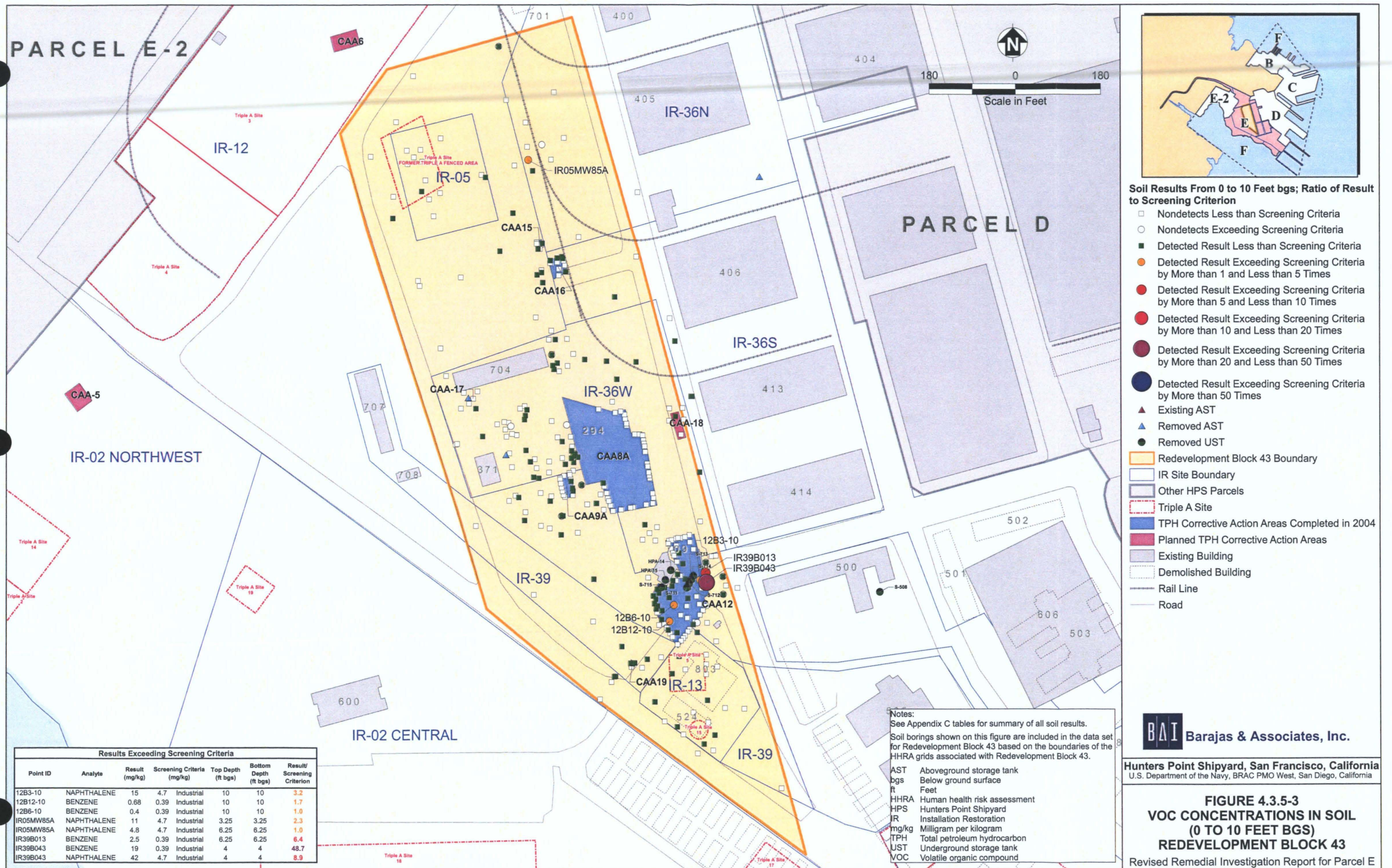
Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

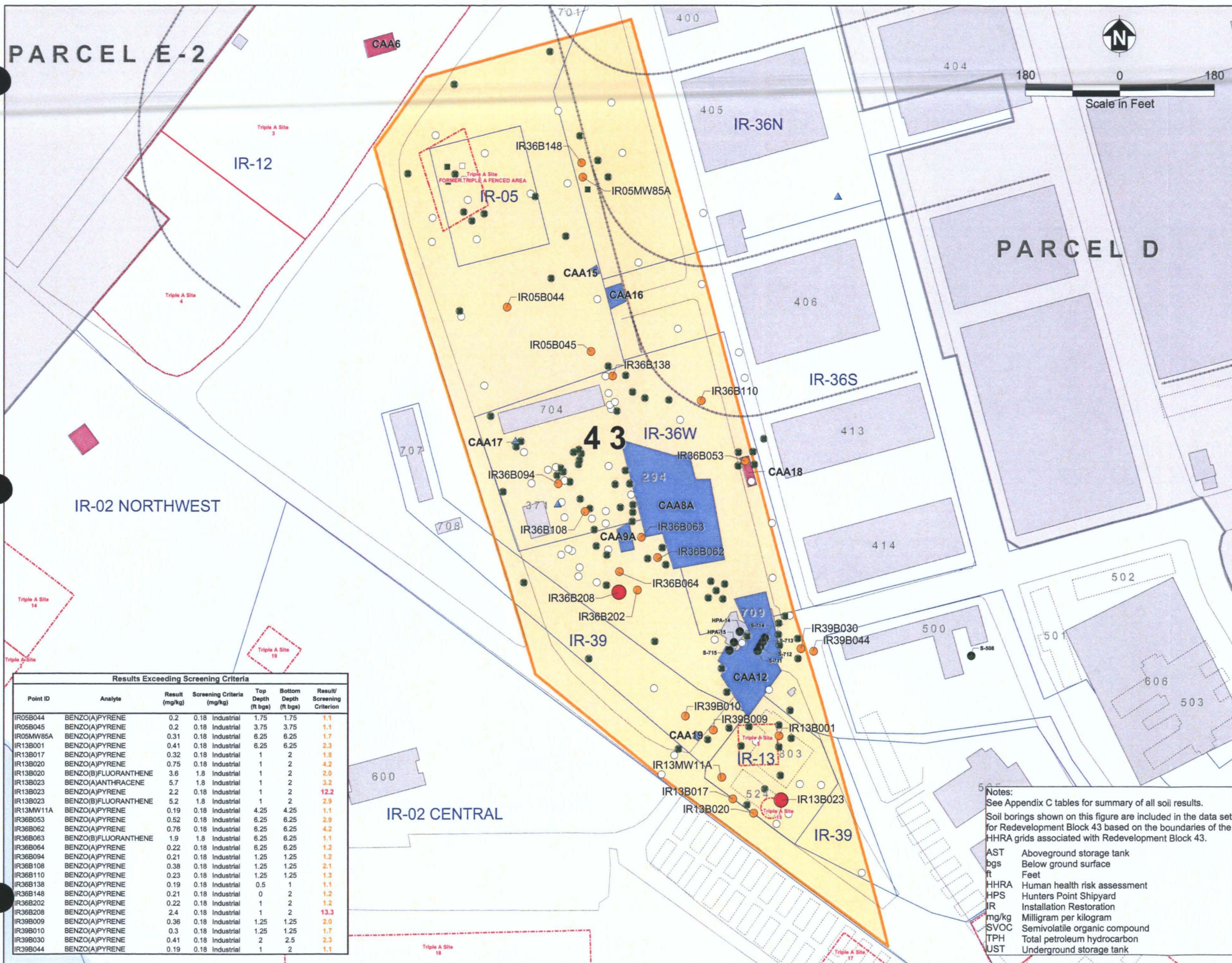
FIGURE 4.3.4-4

GROUNDWATER SAMPLING LOCATIONS IN A-AQUIFER AT REDEVELOPMENT BLOCK 41

Revised Remedial Investigation Report for Parcel E







Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- ▲ Existing AST
- ▲ Removed AST
- Removed UST
- Red outline Redevelopment Block 43 Boundary
- Blue outline IR Site Boundary
- Light blue Other HPS Parcels
- Red dashed outline Triple A Site
- Blue fill TPH Corrective Action Areas Completed in 2004
- Red fill Planned TPH Corrective Action Areas
- Grey fill Existing Building
- White fill Demolished Building
- Black line Rail Line
- Grey line Road

Notes:
See Appendix C tables for summary of all soil results.
Soil borings shown on this figure are included in the data set for Redevelopment Block 43 based on the boundaries of the HHRA grids associated with Redevelopment Block 43.

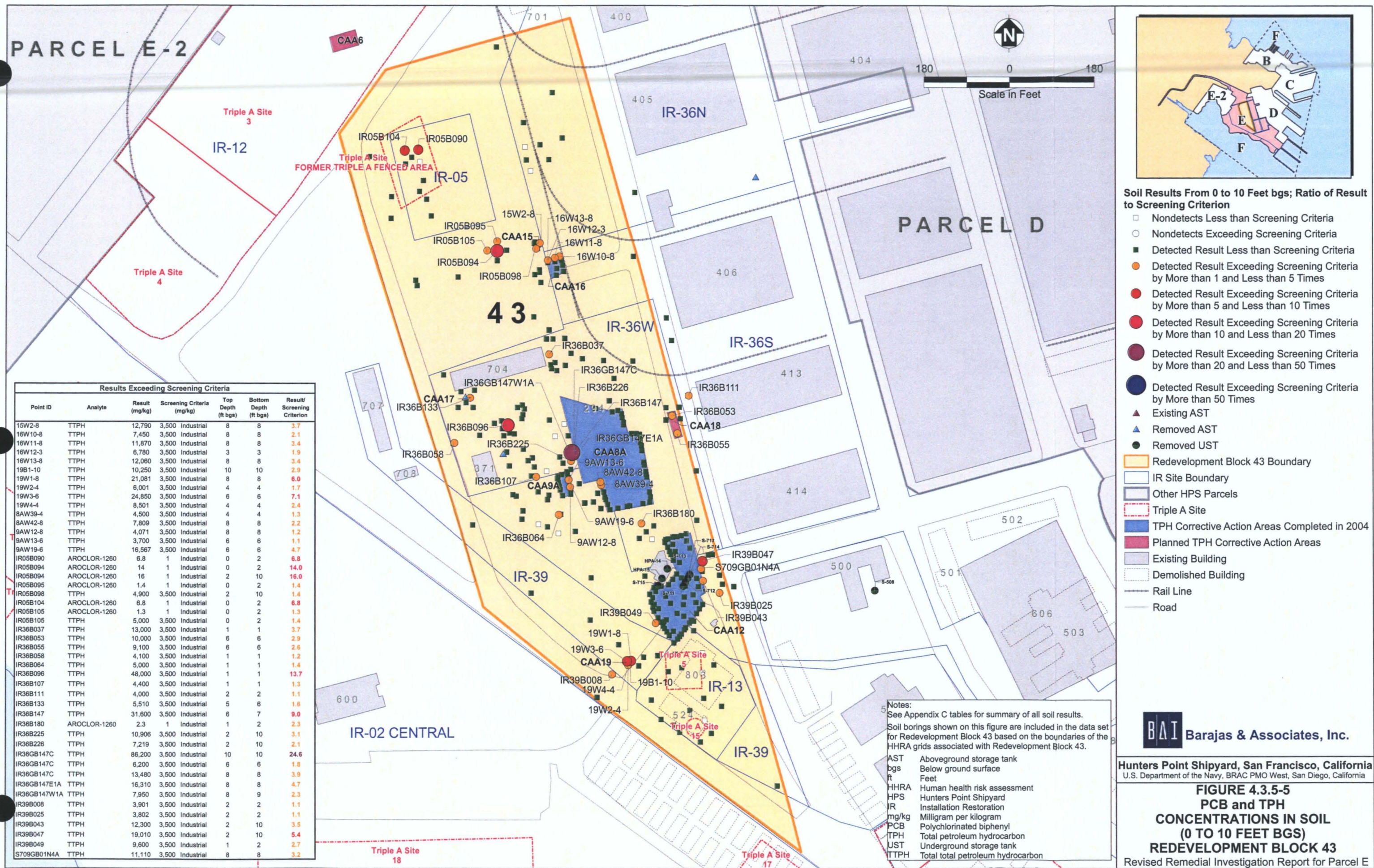
AST Aboveground storage tank
bgs Below ground surface
ft Feet
HHRA Human health risk assessment
HPS Hunters Point Shipyard
IR Installation Restoration
mg/kg Milligram per kilogram
SVOC Semivolatile organic compound
TPH Total petroleum hydrocarbon
UST Underground storage tank

FIGURE 4.3.5-4

SVOC CONCENTRATIONS IN SOIL (0 TO 10 FEET BGS) REDEVELOPMENT BLOCK 43

Revised Remedial Investigation Report for Parcel E

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U.S. Department of the Navy, BRAC PMO West, San Diego, California



Results Exceeding Screening Criteria						
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion
15W2-8	TPPH	12,790	3,500 Industrial	8	8	3.7
16W10-8	TPPH	7,450	3,500 Industrial	8	8	2.1
16W11-8	TPPH	11,870	3,500 Industrial	8	8	3.4
16W12-3	TPPH	6,780	3,500 Industrial	3	3	1.9
16W13-8	TPPH	12,060	3,500 Industrial	8	8	3.4
19B1-10	TPPH	10,250	3,500 Industrial	10	10	2.9
19W1-8	TPPH	21,081	3,500 Industrial	8	8	6.0
19W2-4	TPPH	6,001	3,500 Industrial	4	4	1.7
19W3-6	TPPH	24,850	3,500 Industrial	6	6	7.1
19W4-4	TPPH	8,501	3,500 Industrial	4	4	2.4
8AW39-4	TPPH	4,500	3,500 Industrial	4	4	1.3
8AW42-8	TPPH	7,809	3,500 Industrial	8	8	2.2
9AW12-8	TPPH	4,071	3,500 Industrial	8	8	1.2
9AW13-6	TPPH	3,700	3,500 Industrial	6	6	1.1
9AW19-6	TPPH	16,567	3,500 Industrial	6	6	4.7
IR05B090	AROCOR-1260	6.8	1 Industrial	0	2	6.8
IR05B094	AROCOR-1260	14	1 Industrial	0	2	14.0
IR05B094	AROCOR-1260	16	1 Industrial	2	10	16.0
IR05B095	AROCOR-1260	1.4	1 Industrial	0	2	1.4
IR05B098	TPPH	4,900	3,500 Industrial	2	10	1.4
IR05B104	AROCOR-1260	6.8	1 Industrial	0	2	6.8
IR05B105	AROCOR-1260	1.3	1 Industrial	0	2	1.3
IR05B105	TPPH	5,000	3,500 Industrial	0	2	1.4
IR36B037	TPPH	13,000	3,500 Industrial	1	1	3.7
IR36B053	TPPH	10,000	3,500 Industrial	6	6	2.9
IR36B055	TPPH	9,100	3,500 Industrial	6	6	2.6
IR36B058	TPPH	4,100	3,500 Industrial	1	1	1.2
IR36B064	TPPH	5,000	3,500 Industrial	1	1	1.4
IR36B096	TPPH	48,000	3,500 Industrial	1	1	13.7
IR36B107	TPPH	4,400	3,500 Industrial	1	1	1.3
IR36B111	TPPH	4,000	3,500 Industrial	2	2	1.1
IR36B133	TPPH	5,510	3,500 Industrial	5	6	1.6
IR36B147	TPPH	31,600	3,500 Industrial	6	7	9.0
IR36B180	AROCOR-1260	2.3	1 Industrial	1	2	2.3
IR36B225	TPPH	10,906	3,500 Industrial	2	10	3.1
IR36B226	TPPH	7,219	3,500 Industrial	2	10	2.1
IR36GB147C	TPPH	86,200	3,500 Industrial	10	10	24.6
IR36GB147C	TPPH	6,200	3,500 Industrial	6	6	1.8
IR36GB147C	TPPH	13,480	3,500 Industrial	8	8	3.9
IR36GB147E1A	TPPH	16,310	3,500 Industrial	8	8	4.7
IR36GB147W1A	TPPH	7,950	3,500 Industrial	8	9	2.3
IR39B008	TPPH	3,901	3,500 Industrial	2	2	1.1
IR39B025	TPPH	3,802	3,500 Industrial	2	2	1.1
IR39B043	TPPH	12,300	3,500 Industrial	2	10	3.5
IR39B047	TPPH	19,010	3,500 Industrial	2	10	5.4
IR39B049	TPPH	9,600	3,500 Industrial	1	2	2.7
S709GB01N4A	TPPH	11,110	3,500 Industrial	8	8	3.2

Notes:
See Appendix C tables for summary of all soil results.
Soil borings shown on this figure are included in the data set for Redevelopment Block 43 based on the boundaries of the HHRA grids associated with Redevelopment Block 43.

AST Aboveground storage tank
bgs Below ground surface
ft Feet
HHRA Human health risk assessment
HPS Hunters Point Shipyard
IR Installation Restoration
mg/kg Milligram per kilogram
PCB Polychlorinated biphenyl
TPH Total petroleum hydrocarbon
UST Underground storage tank
ITPH Total total petroleum hydrocarbon

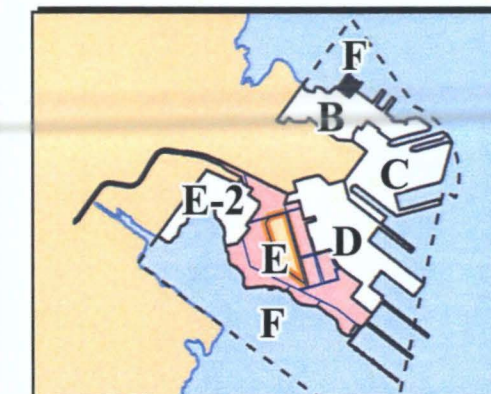
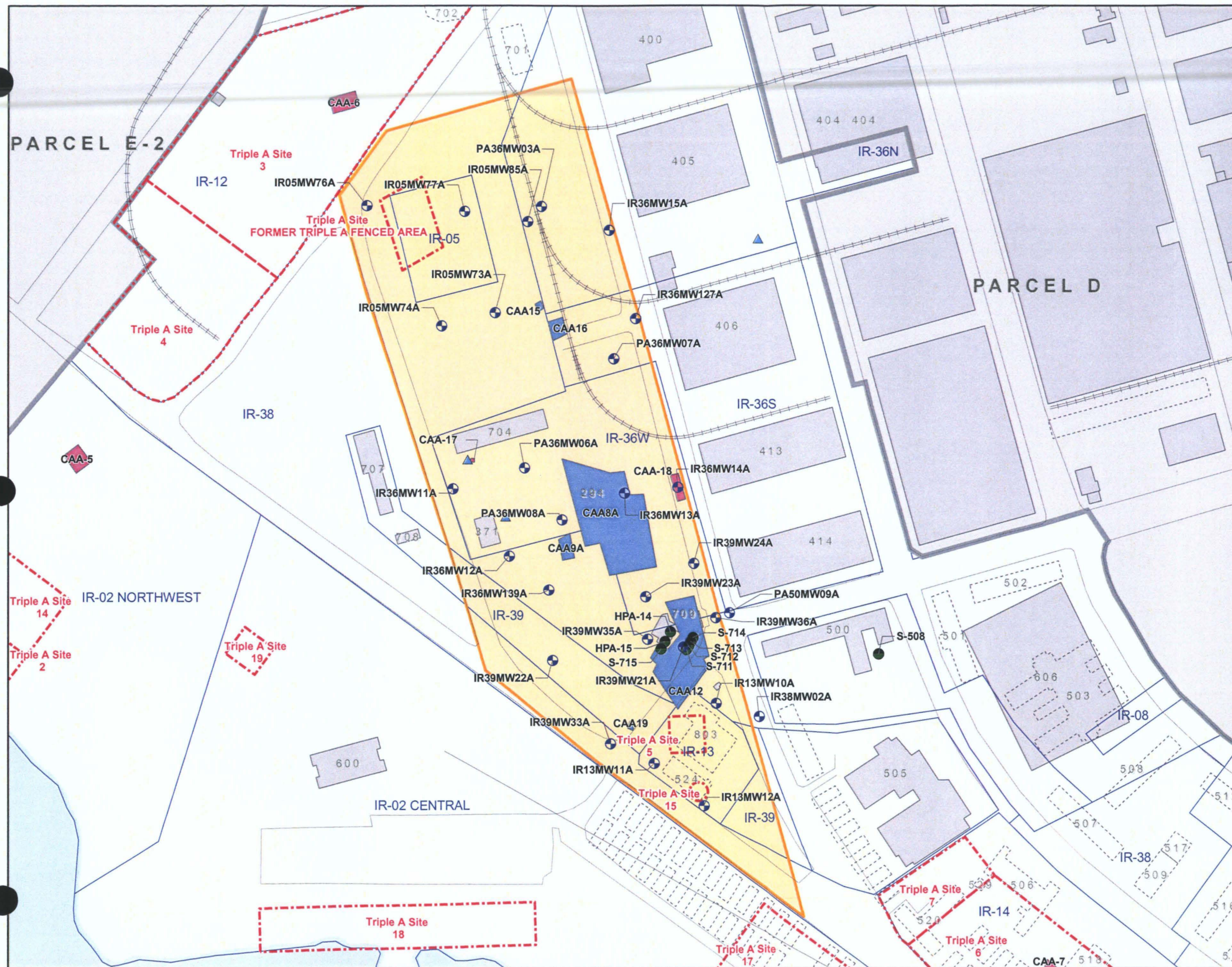
Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- ▲ Existing AST
- ▲ Removed AST
- Removed UST
- Red outline Redevelopment Block 43 Boundary
- Blue outline IR Site Boundary
- Light blue Other HPS Parcels
- Red dashed outline Triple A Site
- Blue fill TPH Corrective Action Areas Completed in 2004
- Red fill Planned TPH Corrective Action Areas
- Grey fill Existing Building
- White fill Demolished Building
- Black line Rail Line
- Grey line Road

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FIGURE 4.3.5-5
PCB and TPH
CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK 43
Revised Remedial Investigation Report for Parcel E



Groundwater Sampling Locations in A-Aquifer

- Monitoring Well in A-Aquifer
- Existing AST
- Removed AST
- Removed UST
- Redevelopment Block 43 Boundary
- IR Site Boundary
- Other HPS Parcels
- Triple A Site
- TPH Corrective Action Areas Completed in 2004
- Planned TPH Corrective Action Areas
- Existing Building
- Demolished Building
- Rail Line
- Road

Notes:

- AST Aboveground storage tank
- HPS Hunters Point Shipyard
- IR Installation Restoration
- TPH Total petroleum hydrocarbon
- UST Underground storage tank



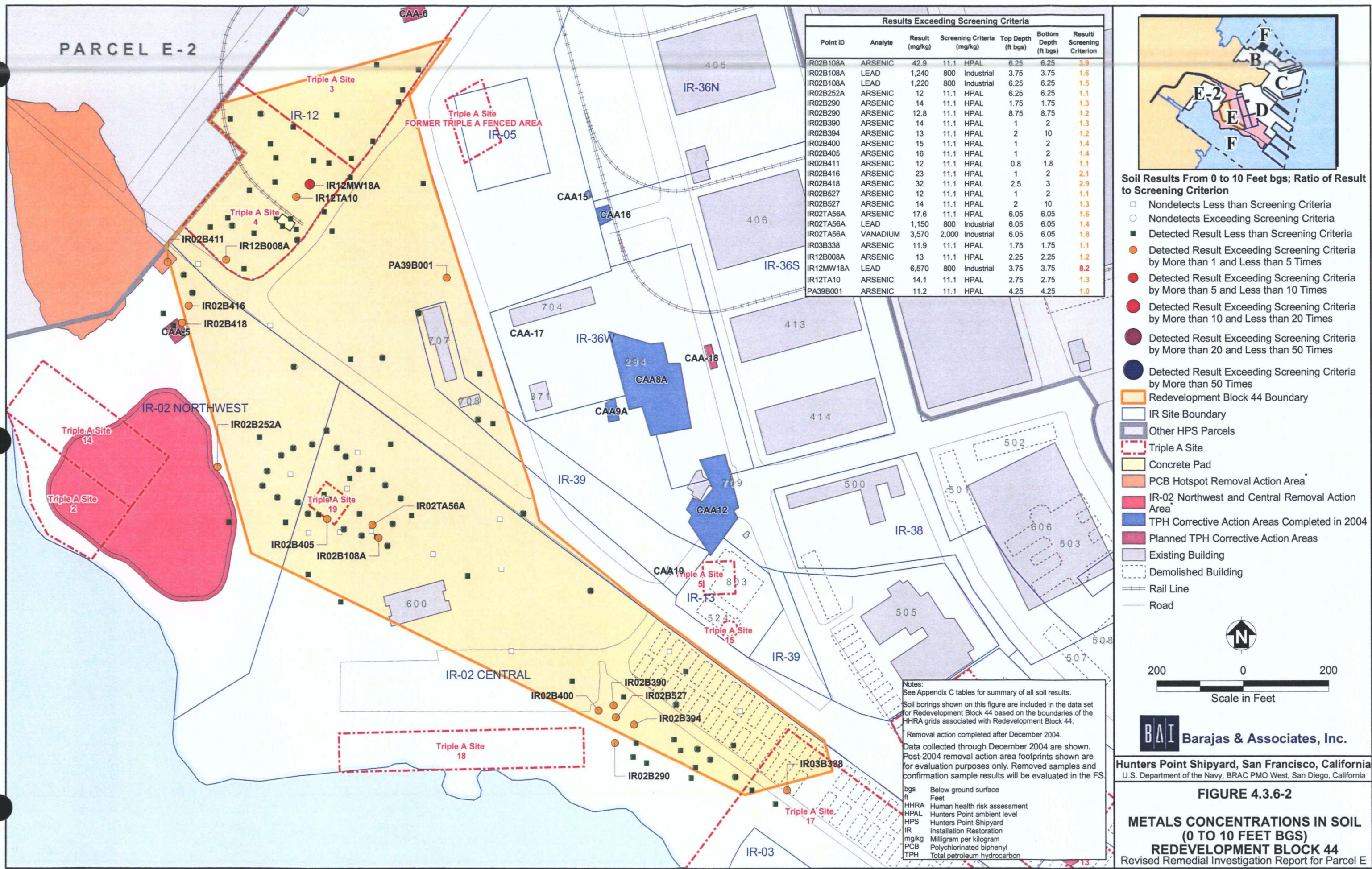
200 0 200
Scale in Feet

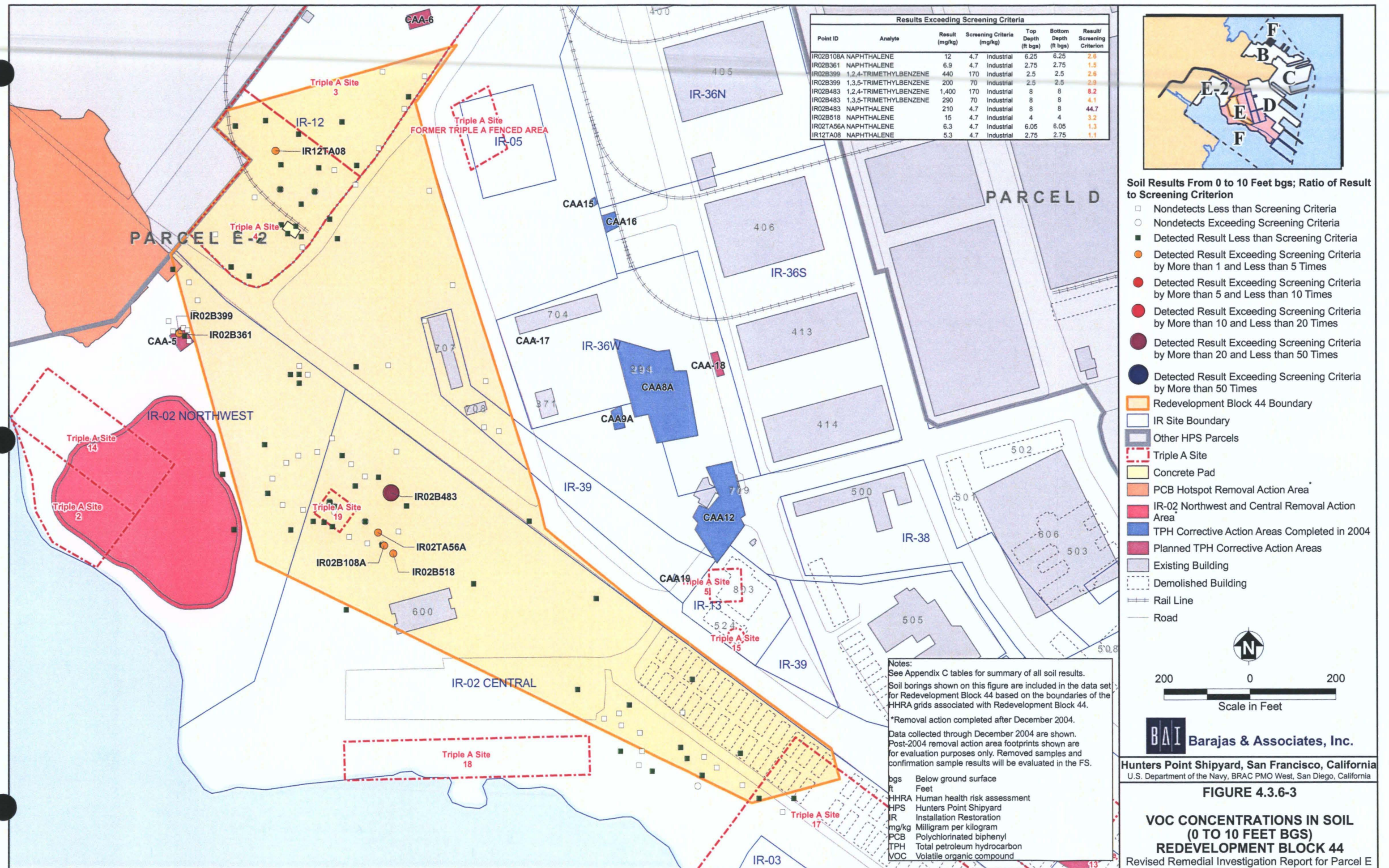
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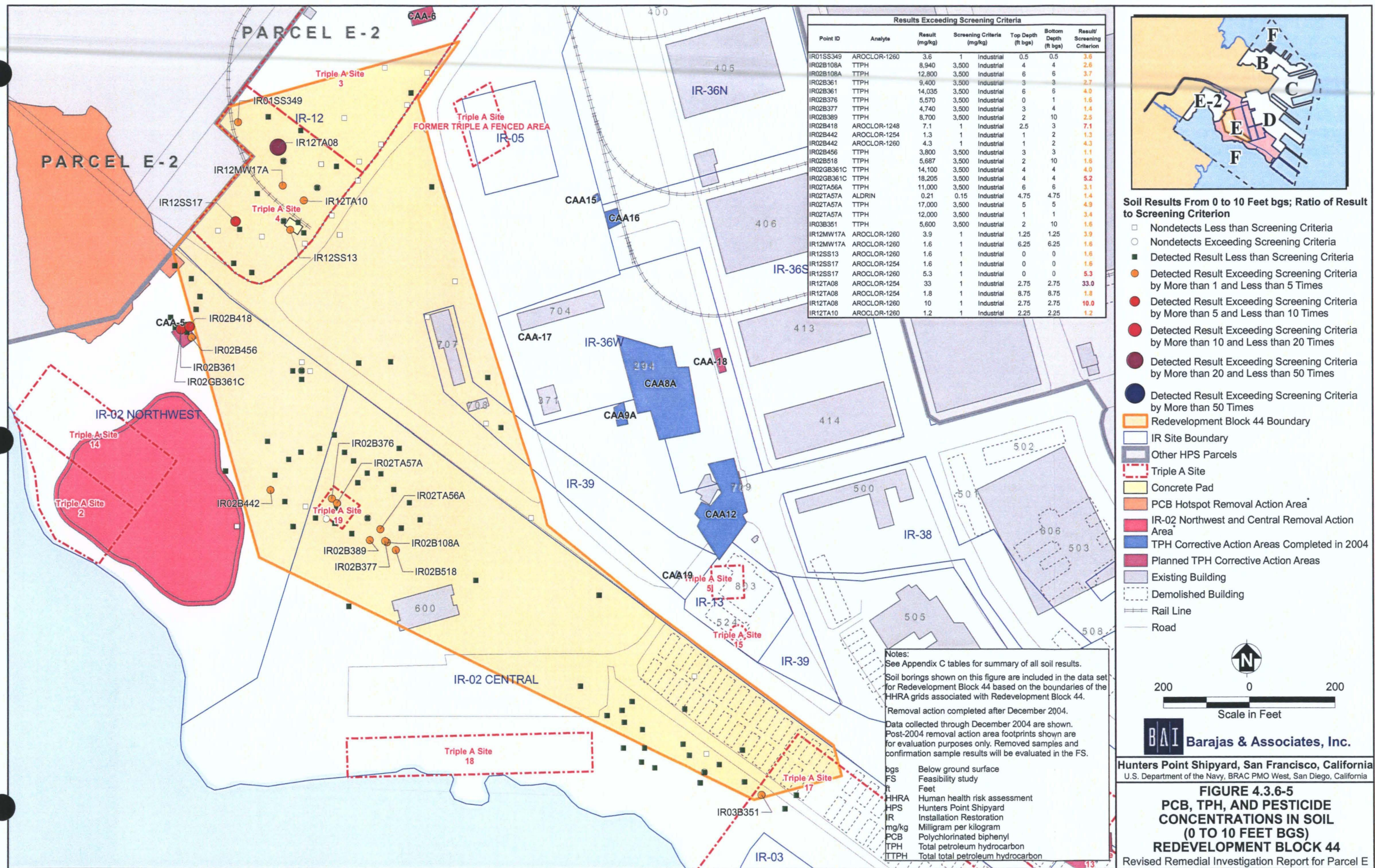
Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 4.3.5-6

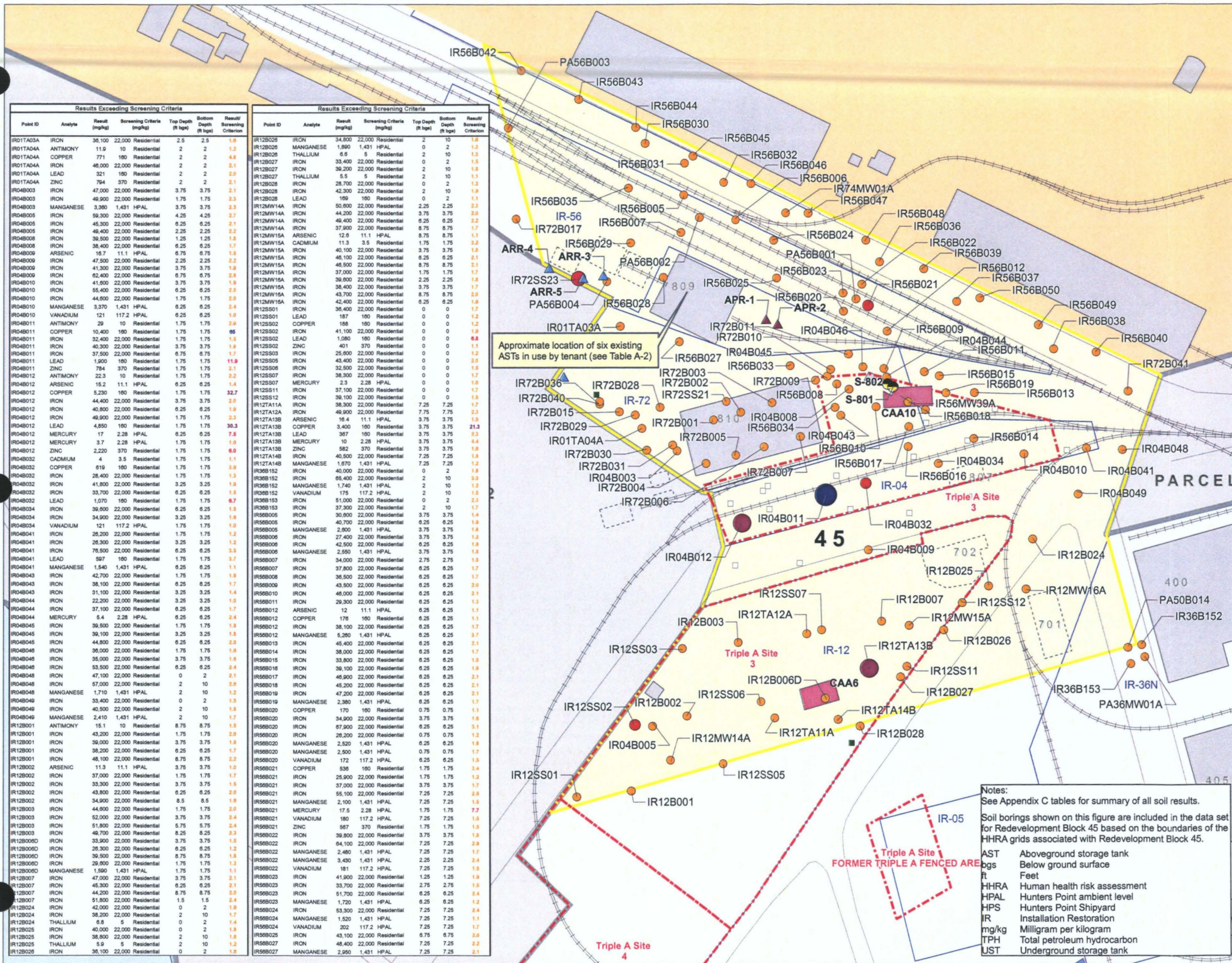
**GROUNDWATER SAMPLING LOCATIONS
IN A-AQUIFER AT
REDEVELOPMENT BLOCK 43**
Revised Remedial Investigation Report for Parcel E

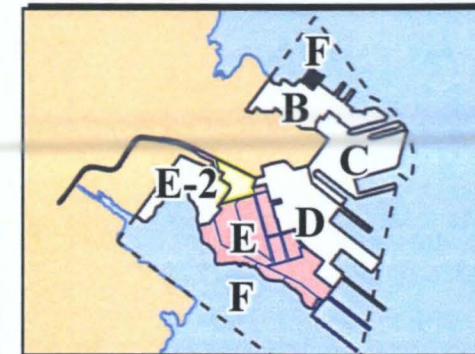
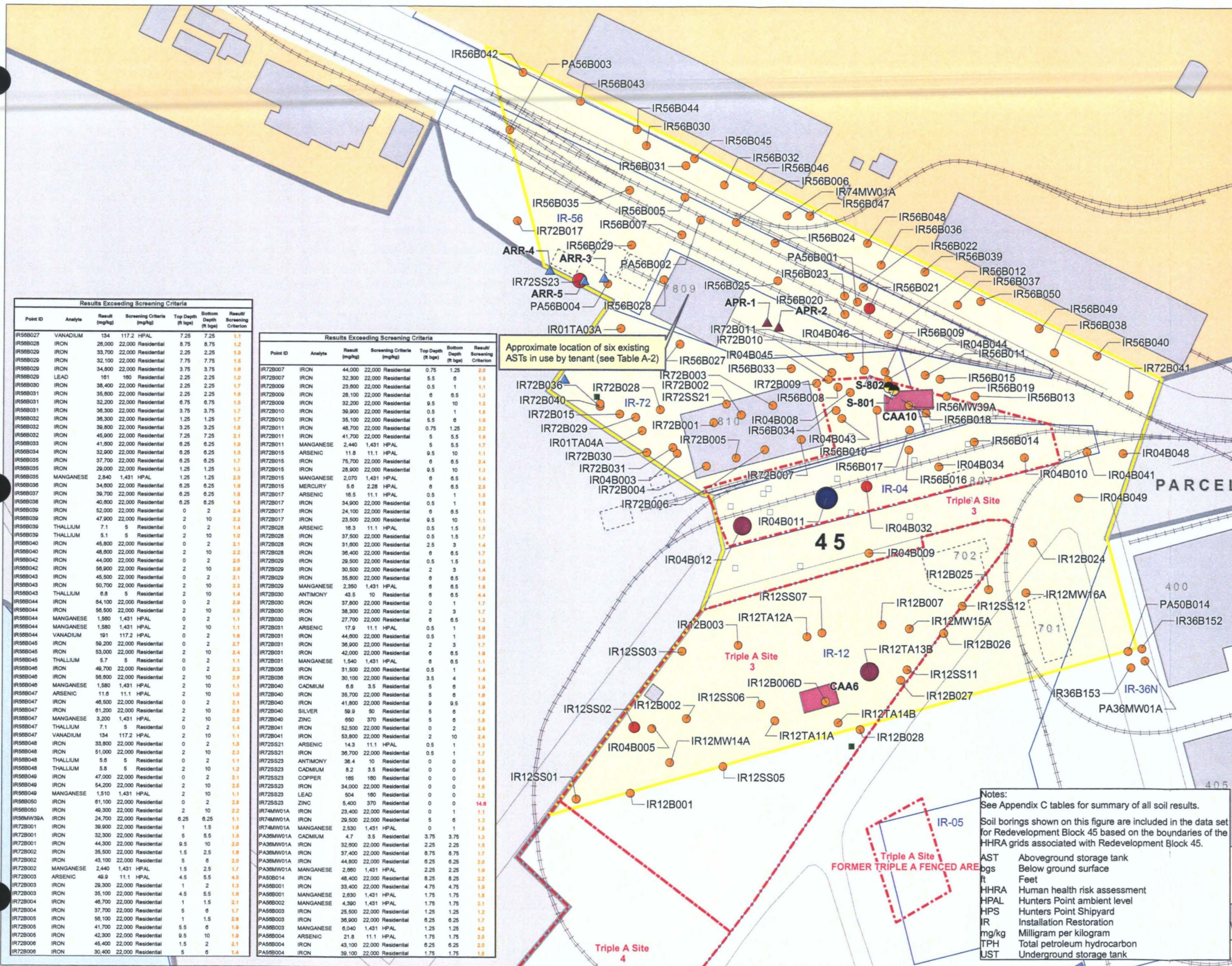












Soil Results From 0 to 10 feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- ▲ Existing AST
- ▲ Removed AST
- UST Closed-in-Place
- Yellow outline: Redevelopment Block 45 Boundary
- Blue outline: IR Site Boundary
- Grey outline: Other HPS Parcels
- Red dashed outline: Triple A Site
- Red solid outline: Planned TPH Corrective Action Areas
- Grey solid outline: Existing Building
- Grey dashed outline: Demolished Building
- Orange solid outline: Non-Navy Property
- Black line: Rail Line
- Black line: Road



150 0 150
Scale in Feet

BAI Barajas & Associates, Inc.

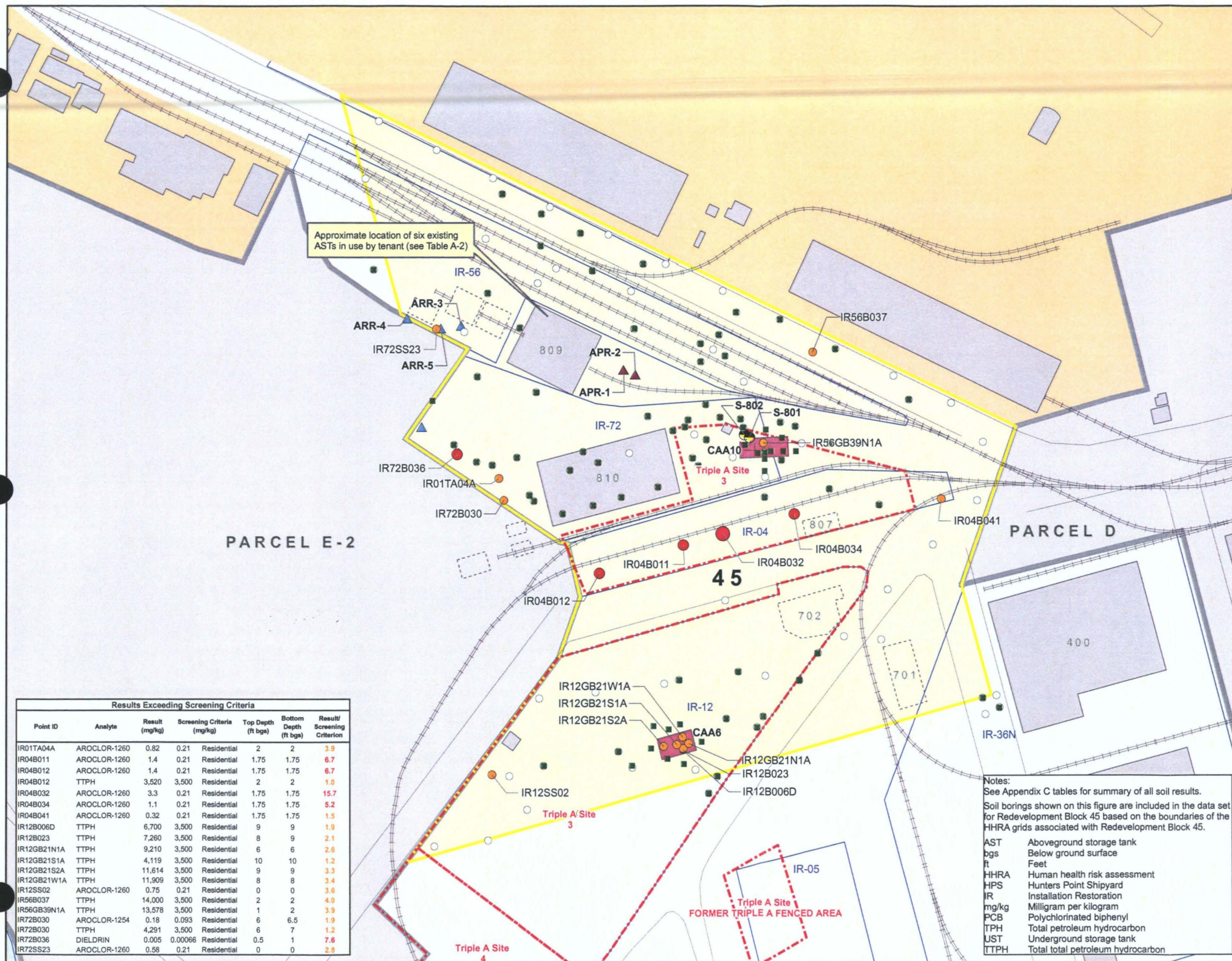
Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 4.3.7-2 (2 of 2) METALS CONCENTRATIONS IN SOIL (0 TO 10 FEET BGS) REDEVELOPMENT BLOCK 45

Revised Remedial Investigation Report for Parcel E

Notes:
See Appendix C tables for summary of all soil results.
Soil borings shown on this figure are included in the data set for Redevelopment Block 45 based on the boundaries of the HHRA grids associated with Redevelopment Block 45.

AST Aboveground storage tank
bgs Below ground surface
ft Feet
HHRA Human health risk assessment
HPAL Hunters Point ambient level
HPS Hunters Point Shipyard
IR Installation Restoration
mg/kg Milligram per kilogram
TPH Total petroleum hydrocarbon
UST Underground storage tank

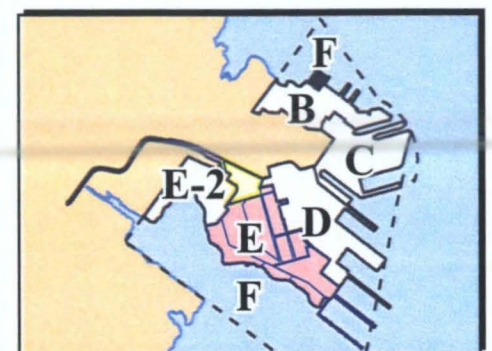


Approximate location of six existing ASTs in use by tenant (see Table A-2)

Results Exceeding Screening Criteria						
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion
IR01TA04A	AROCLOR-1260	0.82	0.21	Residential	2	3.9
IR04B011	AROCLOR-1260	1.4	0.21	Residential	1.75	6.7
IR04B012	AROCLOR-1260	1.4	0.21	Residential	1.75	6.7
IR04B012	TTPH	3,520	3,500	Residential	2	1.0
IR04B032	AROCLOR-1260	3.3	0.21	Residential	1.75	15.7
IR04B034	AROCLOR-1260	1.1	0.21	Residential	1.75	5.2
IR04B041	AROCLOR-1260	0.32	0.21	Residential	1.75	1.5
IR12B006D	TTPH	6,700	3,500	Residential	9	1.9
IR12B023	TTPH	7,260	3,500	Residential	8	2.1
IR12GB21N1A	TTPH	9,210	3,500	Residential	6	2.6
IR12GB21S1A	TTPH	4,119	3,500	Residential	10	1.2
IR12GB21S2A	TTPH	11,614	3,500	Residential	9	3.3
IR12GB21W1A	TTPH	11,909	3,500	Residential	8	3.4
IR12SS02	AROCLOR-1260	0.75	0.21	Residential	0	3.6
IR56B037	TTPH	14,000	3,500	Residential	2	4.0
IR56GB39N1A	TTPH	13,578	3,500	Residential	1	3.9
IR72B030	AROCLOR-1254	0.18	0.093	Residential	6	1.9
IR72B030	TTPH	4,291	3,500	Residential	6	1.2
IR72B036	DIELDRIN	0.005	0.00066	Residential	0.5	7.6
IR72SS23	AROCLOR-1260	0.58	0.21	Residential	0	2.8

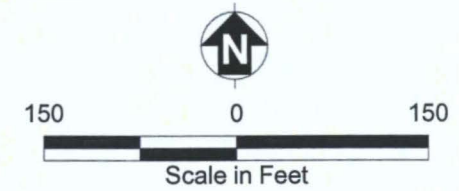
Notes:
See Appendix C tables for summary of all soil results.
Soil borings shown on this figure are included in the data set for Redevelopment Block 45 based on the boundaries of the HHRA grids associated with Redevelopment Block 45.

AST Aboveground storage tank
bgs Below ground surface
ft Feet
HHRA Human health risk assessment
HPS Hunters Point Shipyard
IR Installation Restoration
mg/kg Milligram per kilogram
PCB Polychlorinated biphenyl
TPH Total petroleum hydrocarbon
UST Underground storage tank
TTPH Total total petroleum hydrocarbon



Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

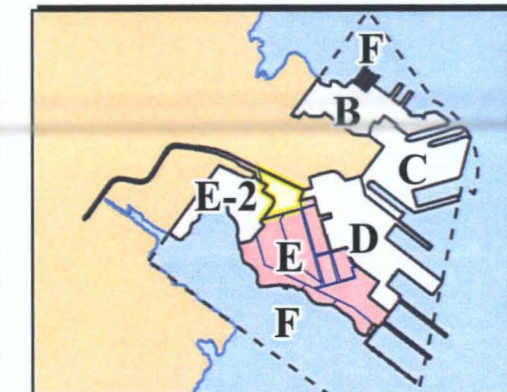
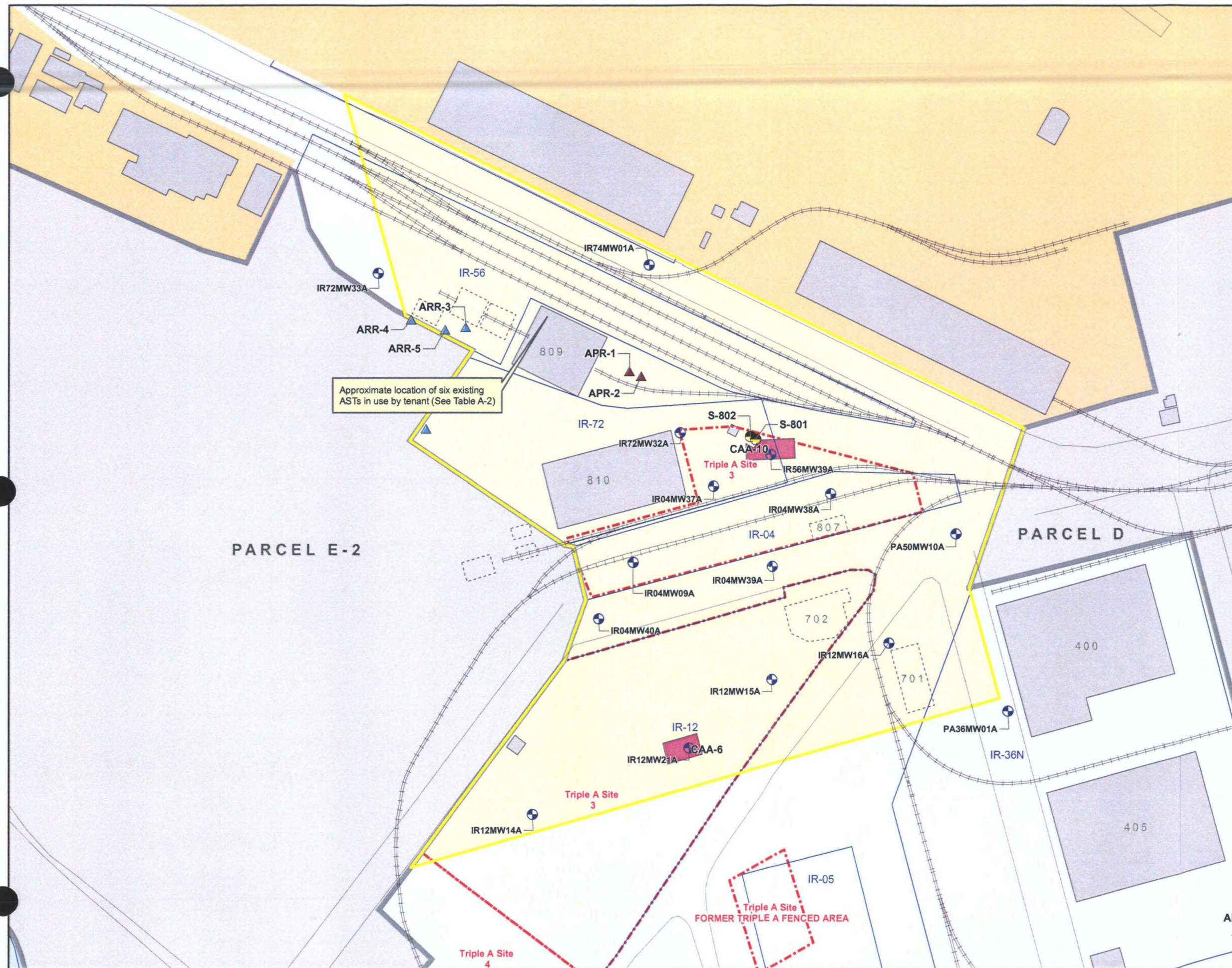
- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- ▲ Existing AST
- ▲ Removed AST
- UST Closed-in-Place
- Yellow outline Redevelopment Block 45 Boundary
- Blue outline IR Site Boundary
- Grey outline Other HPS Parcels
- Red dashed outline Triple A Site
- Red solid outline TPH Corrective Action Areas
- Grey solid Existing Building
- Grey dashed Demolished Building
- Orange solid Non-Navy Property
- Black line Rail Line
- Black line Road



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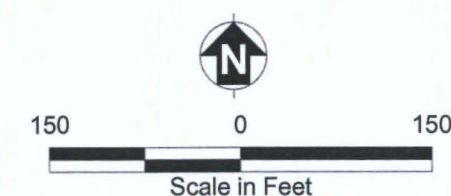
FIGURE 4.3.7-4
PCB, TPH, AND PESTICIDE
CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK 45
Revised Remedial Investigation Report for Parcel E



Groundwater Sampling Locations in A-Aquifer

- Monitoring Well in A-Aquifer
- Existing AST
- Removed AST
- UST Closed-in-Place
- Redevelopment Block 45 Boundary
- IR Site Boundary
- Other HPS Parcels
- Triple A Site
- Planned TPH Corrective Action Areas
- Existing Building
- Demolished Building
- Non-Navy Property
- Rail Line
- Road

Notes:
 AST Aboveground storage tank
 HPS Hunters Point Shipyard
 IR Installation Restoration
 TPH Total petroleum hydrocarbon
 UST Underground storage tank

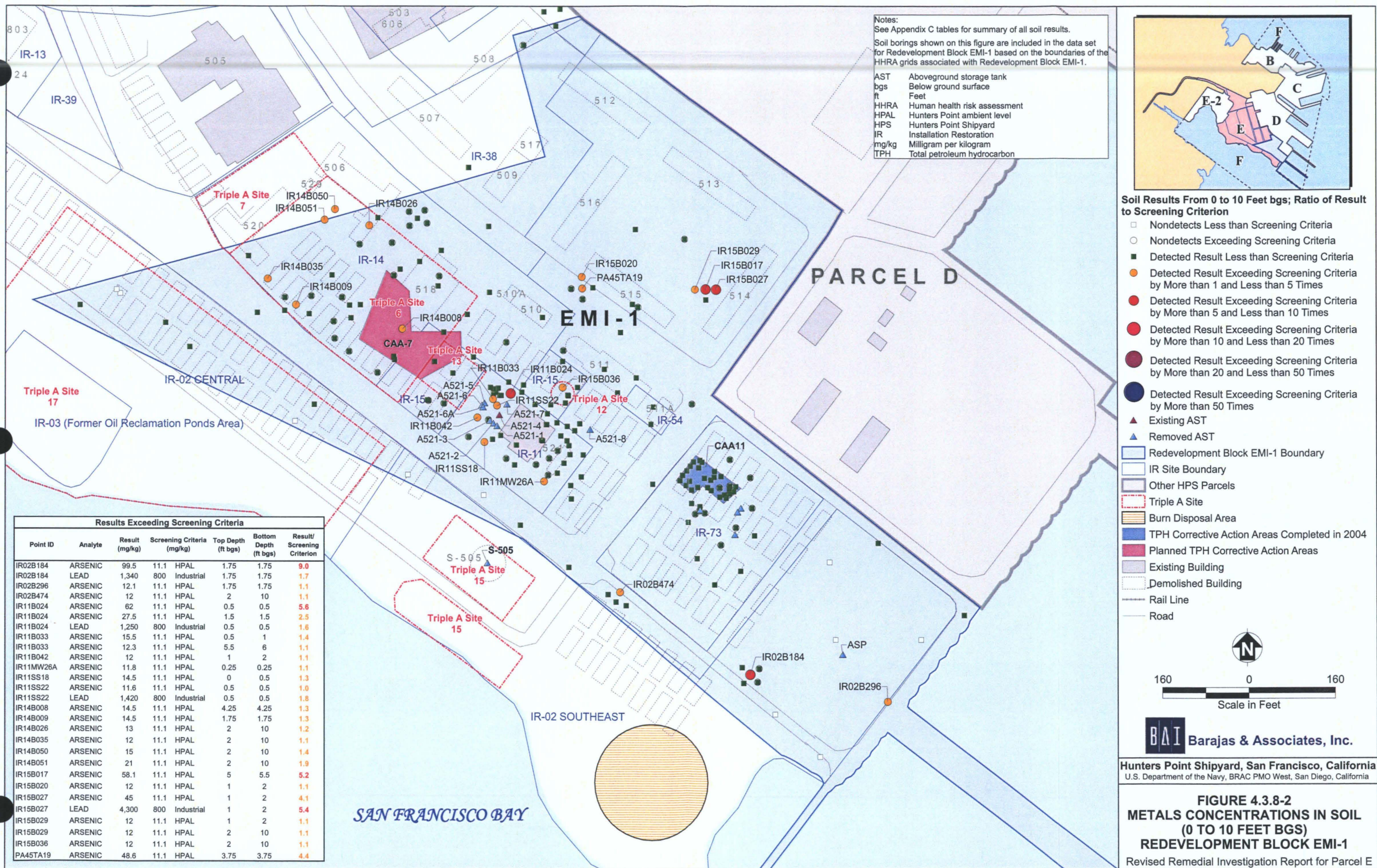


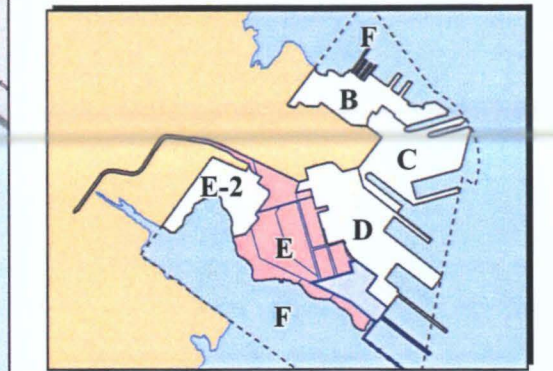
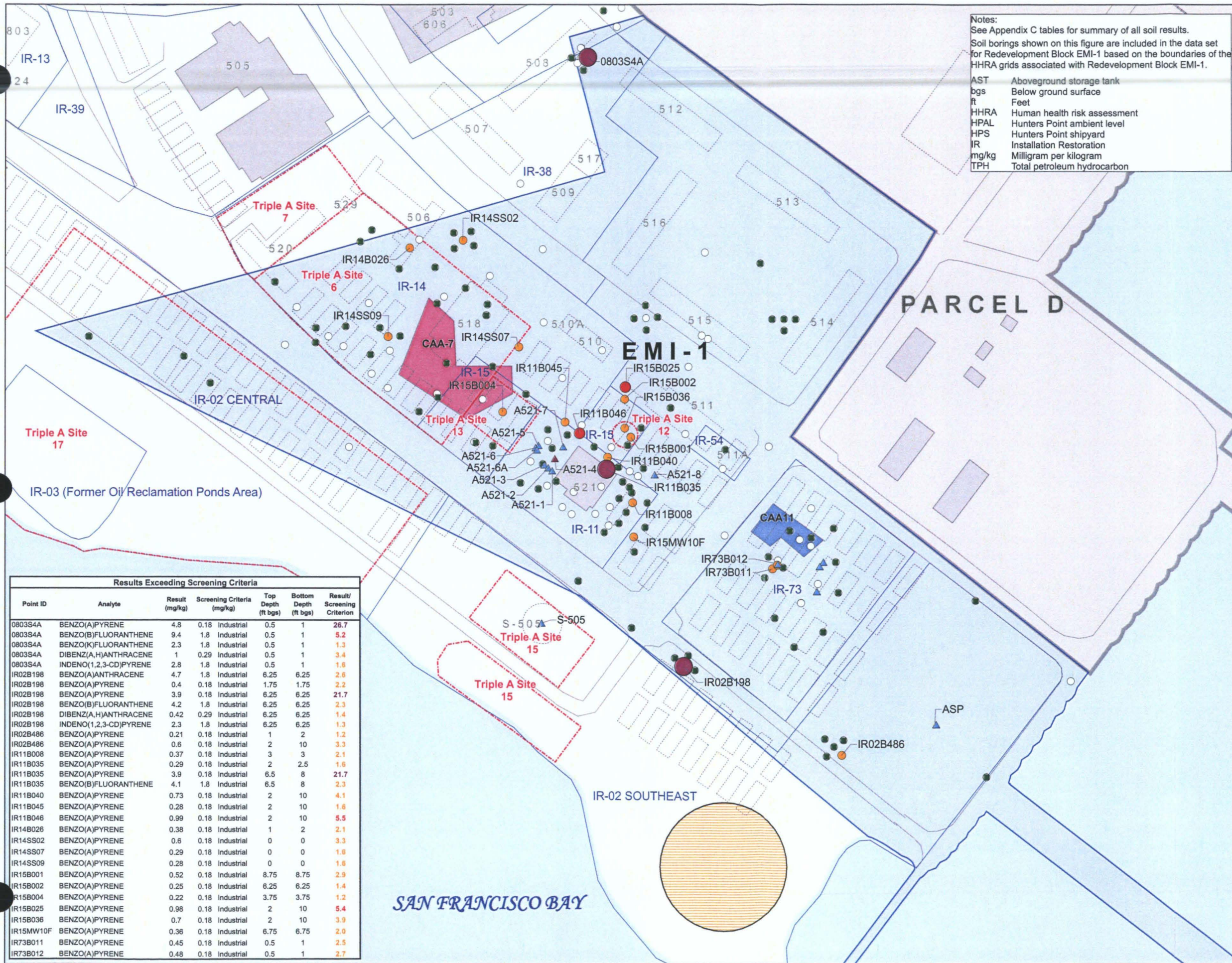
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Hunters Point Shipyard, San Francisco, California
 U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 4.3.7-5

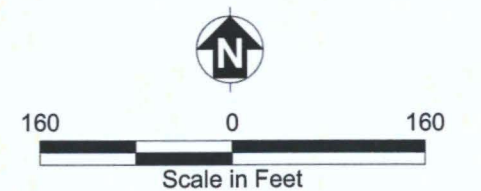
**GROUNDWATER SAMPLING
 LOCATIONS
 IN REDEVELOPMENT BLOCK 45**
 Revised Remedial Investigation Report for Parcel E





Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- ▲ Existing AST
- ▲ Removed AST
- Redevelopment Block EMI-1 Boundary
- IR Site Boundary
- Other HPS Parcels
- Triple A Site
- Burn Disposal Area
- TPH Corrective Action Areas Completed in 2004
- Planned TPH Corrective Action Areas
- Existing Building
- Demolished Building
- Rail Line
- Road

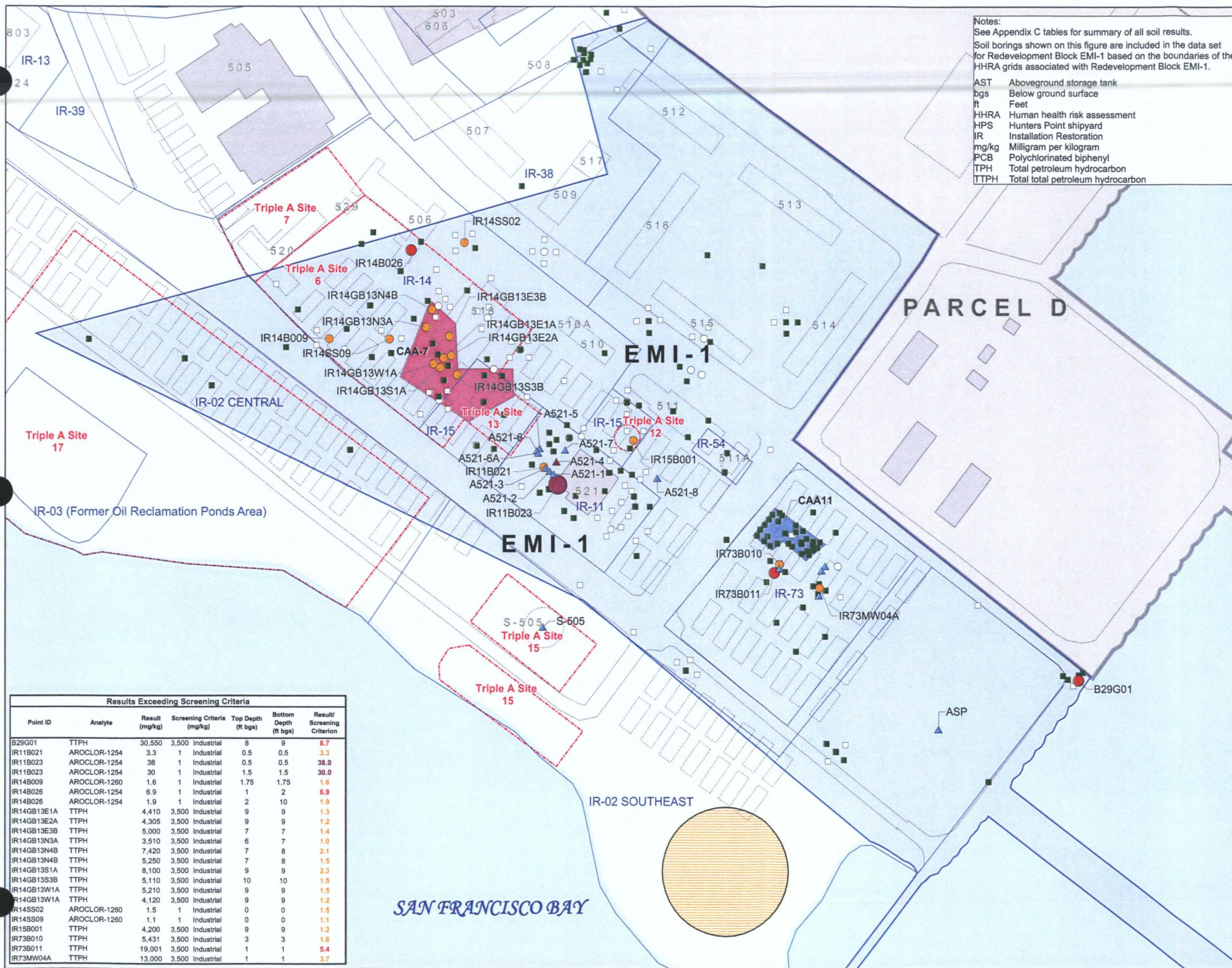


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U.S. Department of the Navy, BRAC PMO West, San Diego, California

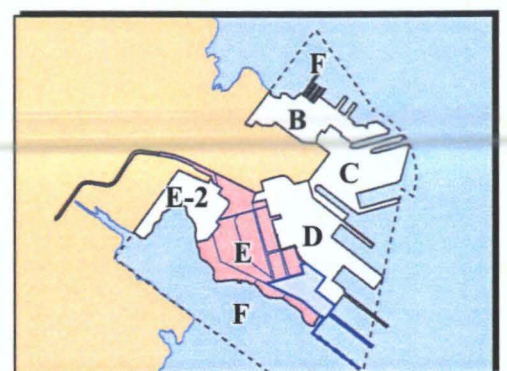
FIGURE 4.3.8-3

SVOC CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK EMI-1
Revised Remedial Investigation Report for Parcel E



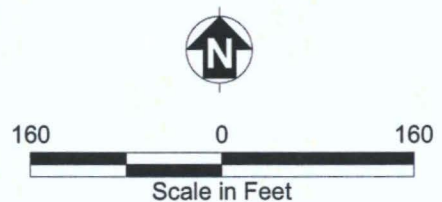
Notes:
See Appendix C tables for summary of all soil results.
Soil borings shown on this figure are included in the data set for Redevelopment Block EMI-1 based on the boundaries of the HHRA grids associated with Redevelopment Block EMI-1.

AST Aboveground storage tank
bgs Below ground surface
ft Feet
HHRA Human health risk assessment
HPS Hunters Point shipyard
IR Installation Restoration
mg/kg Milligram per kilogram
PCB Polychlorinated biphenyl
TPH Total petroleum hydrocarbon
TTPH Total total petroleum hydrocarbon



Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- ▲ Existing AST
- ▲ Removed AST
- Redevelopment Block EMI-1 Boundary
- IR Site Boundary
- Other HPS Parcels
- Triple A Site
- Burn Disposal Area
- TPH Corrective Action Areas Completed in 2004
- Planned TPH Corrective Action Areas
- Existing Building
- Demolished Building
- Rail Line
- Road

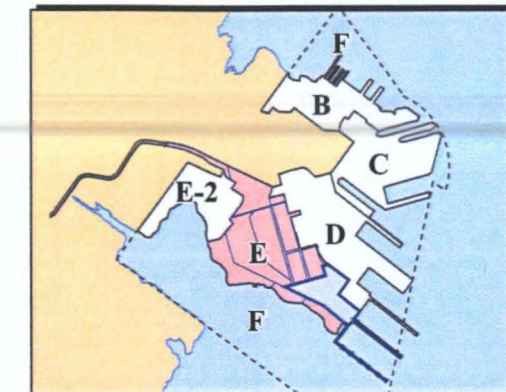
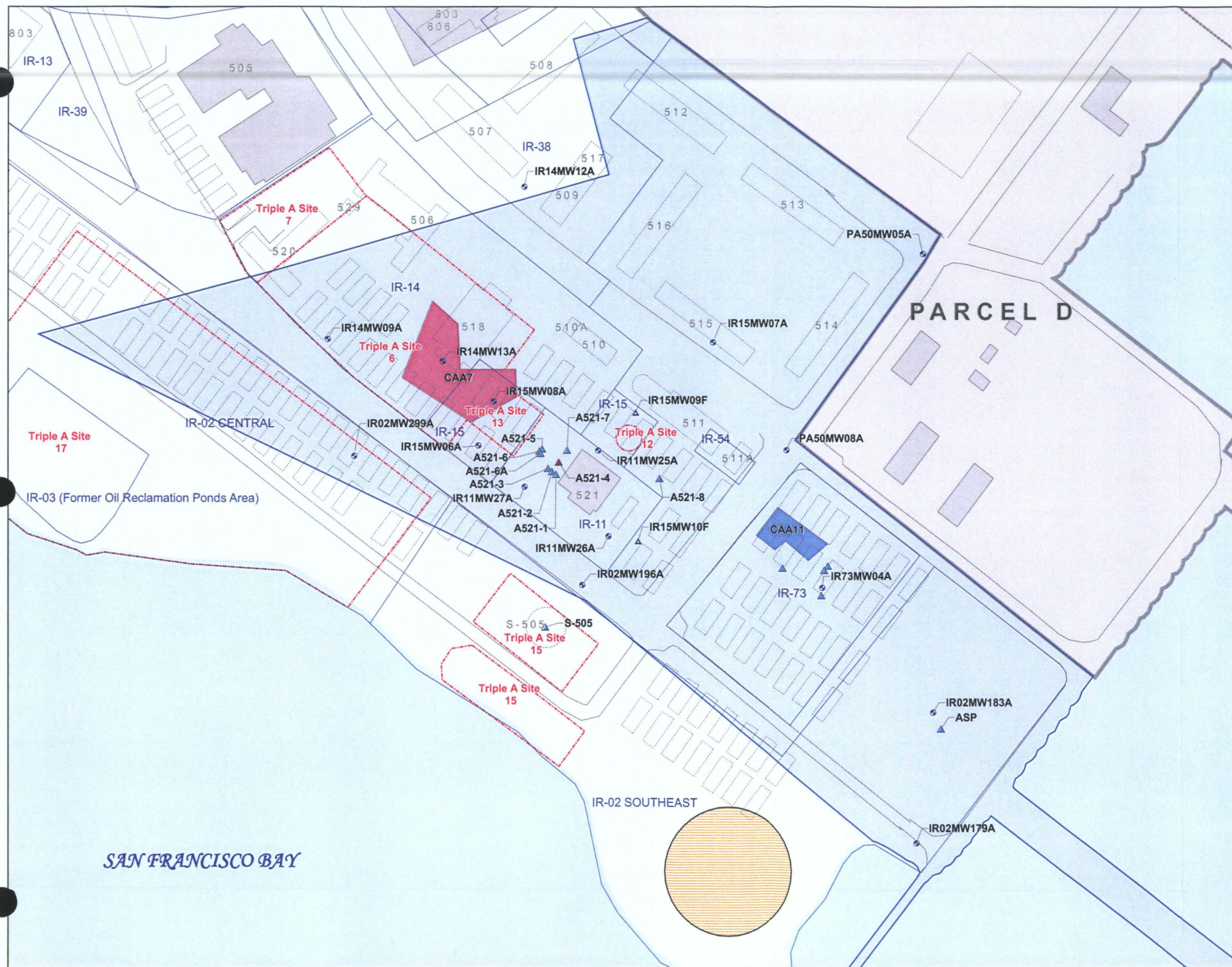


Results Exceeding Screening Criteria						
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion
B29G01	TTPH	30,550	3,500 Industrial	8	9	8.7
IR11B021	AROCLO-1254	3.3	1 Industrial	0.5	0.5	3.3
IR11B023	AROCLO-1254	38	1 Industrial	0.5	0.5	38.0
IR11B023	AROCLO-1254	30	1 Industrial	1.5	1.5	30.0
IR14B009	AROCLO-1260	1.6	1 Industrial	1.75	1.75	1.6
IR14B026	AROCLO-1254	6.9	1 Industrial	1	2	6.9
IR14B026	AROCLO-1254	1.9	1 Industrial	2	10	1.9
IR14GB13E1A	TTPH	4,410	3,500 Industrial	9	9	1.3
IR14GB13E2A	TTPH	4,305	3,500 Industrial	9	9	1.2
IR14GB13E3B	TTPH	5,000	3,500 Industrial	7	7	1.4
IR14GB13N3A	TTPH	3,510	3,500 Industrial	6	7	1.0
IR14GB13N4B	TTPH	7,420	3,500 Industrial	7	8	2.1
IR14GB13N4B	TTPH	5,250	3,500 Industrial	7	8	1.5
IR14GB13S1A	TTPH	8,100	3,500 Industrial	9	9	2.3
IR14GB13S3B	TTPH	5,110	3,500 Industrial	10	10	1.5
IR14GB13W1A	TTPH	5,210	3,500 Industrial	9	9	1.5
IR14GB13W1A	TTPH	4,120	3,500 Industrial	9	9	1.2
IR14SS02	AROCLO-1260	1.5	1 Industrial	0	0	1.5
IR14SS09	AROCLO-1260	1.1	1 Industrial	0	0	1.1
IR15B001	TTPH	4,200	3,500 Industrial	9	9	1.2
IR73B010	TTPH	5,431	3,500 Industrial	3	3	1.6
IR73B011	TTPH	19,001	3,500 Industrial	1	1	5.4
IR73MW04A	TTPH	13,000	3,500 Industrial	1	1	3.7

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FIGURE 4.3.8-4
PCB, TPH AND PESTICIDES
CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK EMI-1
Revised Remedial Investigation Report for Parcel E



Groundwater Sampling Locations in A-Aquifer and Bedrock Water-Bearing Zone

- Monitoring Well in A-Aquifer
- ▲ Monitoring Well in Bedrock Water-Bearing Zone
- ▲ Existing AST
- ▲ Removed AST
- Redevelopment Block EMI-1 Boundary
- IR Site Boundary
- Other HPS Parcels
- Triple A Site
- Burn Disposal Area
- TPH Corrective Action Areas Completed in 2004
- Planned TPH Corrective Action Areas
- Existing Building
- Demolished Building
- Rail Line
- Road

Notes:

- AST Aboveground storage tank
- HPS Hunters Point Shipyard
- IR Installation Restoration
- TPH Total petroleum hydrocarbon



160 0 160
Scale in Feet

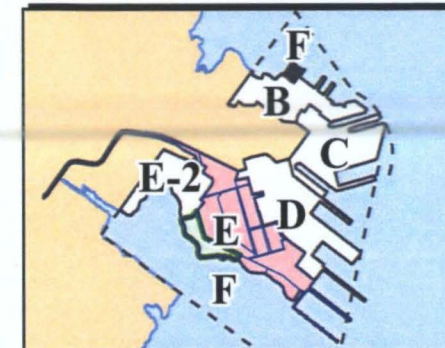
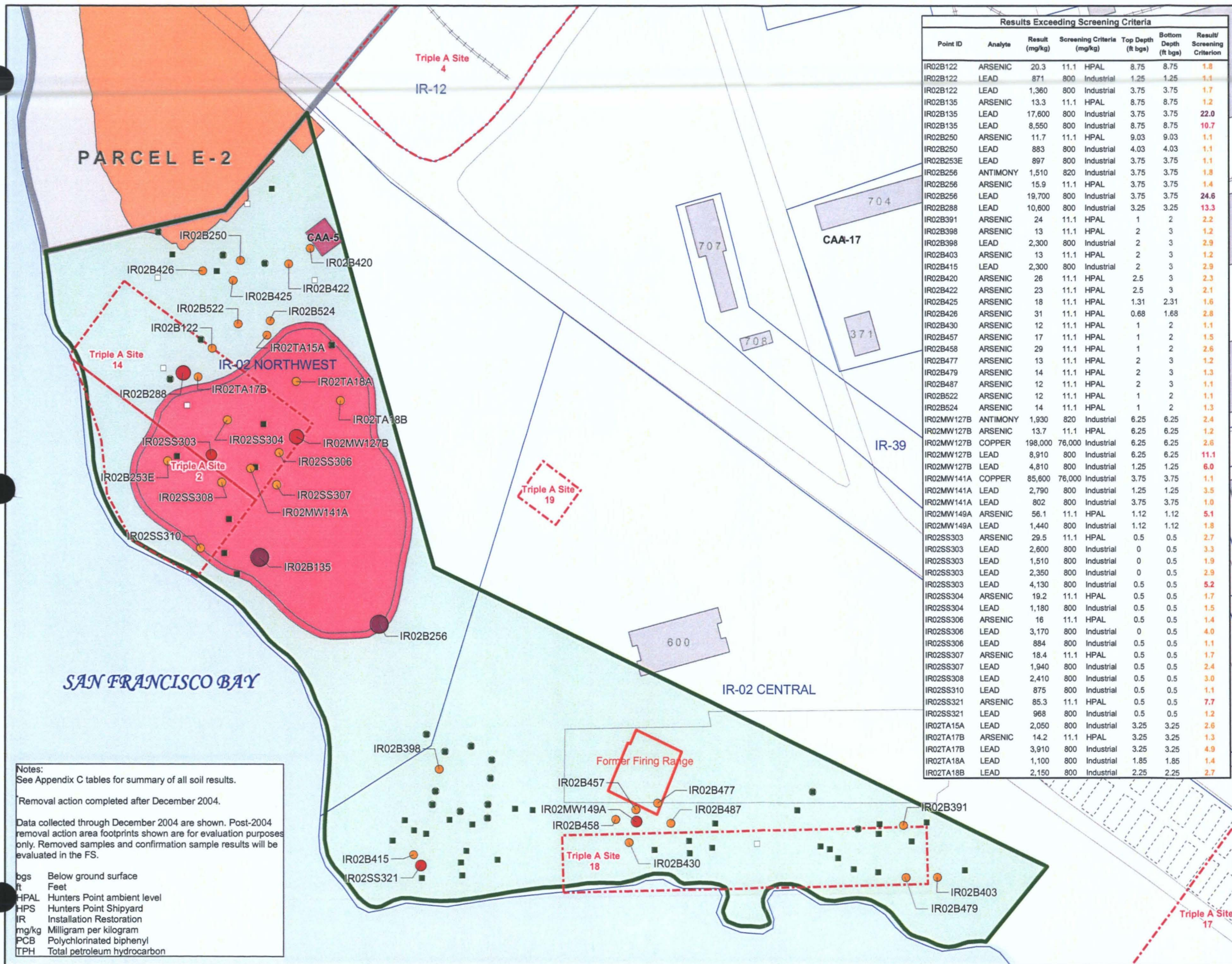
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FIGURE 4.3.8-5

GROUNDWATER SAMPLING LOCATIONS REDEVELOPMENT BLOCK EMI-1

Revised Remedial Investigation Report for Parcel E



Soil Results From 0 to 10 feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times

- Redevelopment Block EOS-1 Boundary
- IR Site Boundary
- Other HPS Parcels
- Triple A Site
- Former Firing Range
- PCB Hotspot Removal Action Area
- IR-02 Northwest and Central Removal Action Area
- Planned TPH Corrective Action Areas
- Existing Building
- Demolished Building
- Rail Line
- Road



150 0 150
Scale in Feet

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FIGURE 4.3.9-2

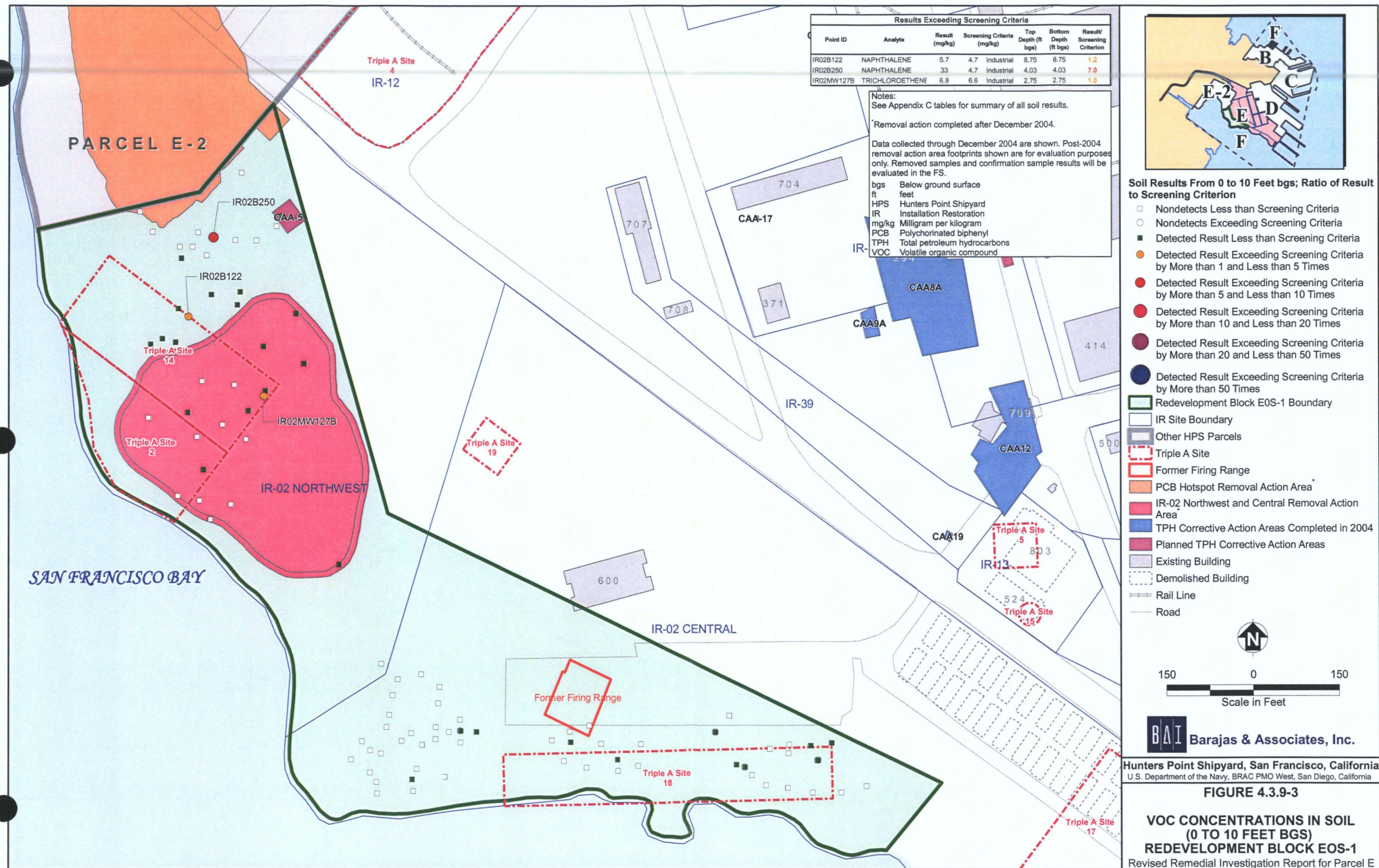
**METALS CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK EOS-1
Revised Remedial Investigation Report for Parcel E**

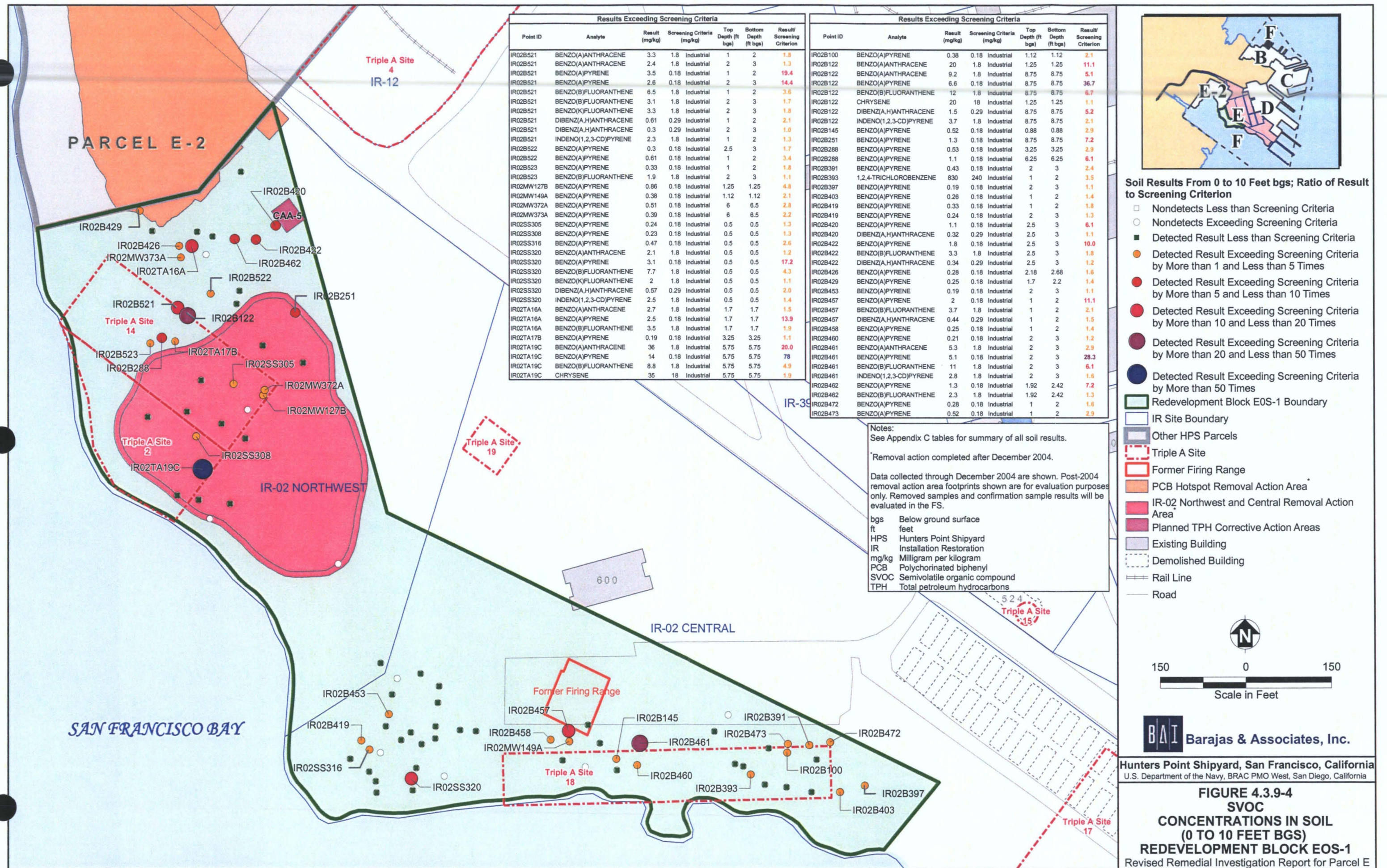
Notes:
See Appendix C tables for summary of all soil results.

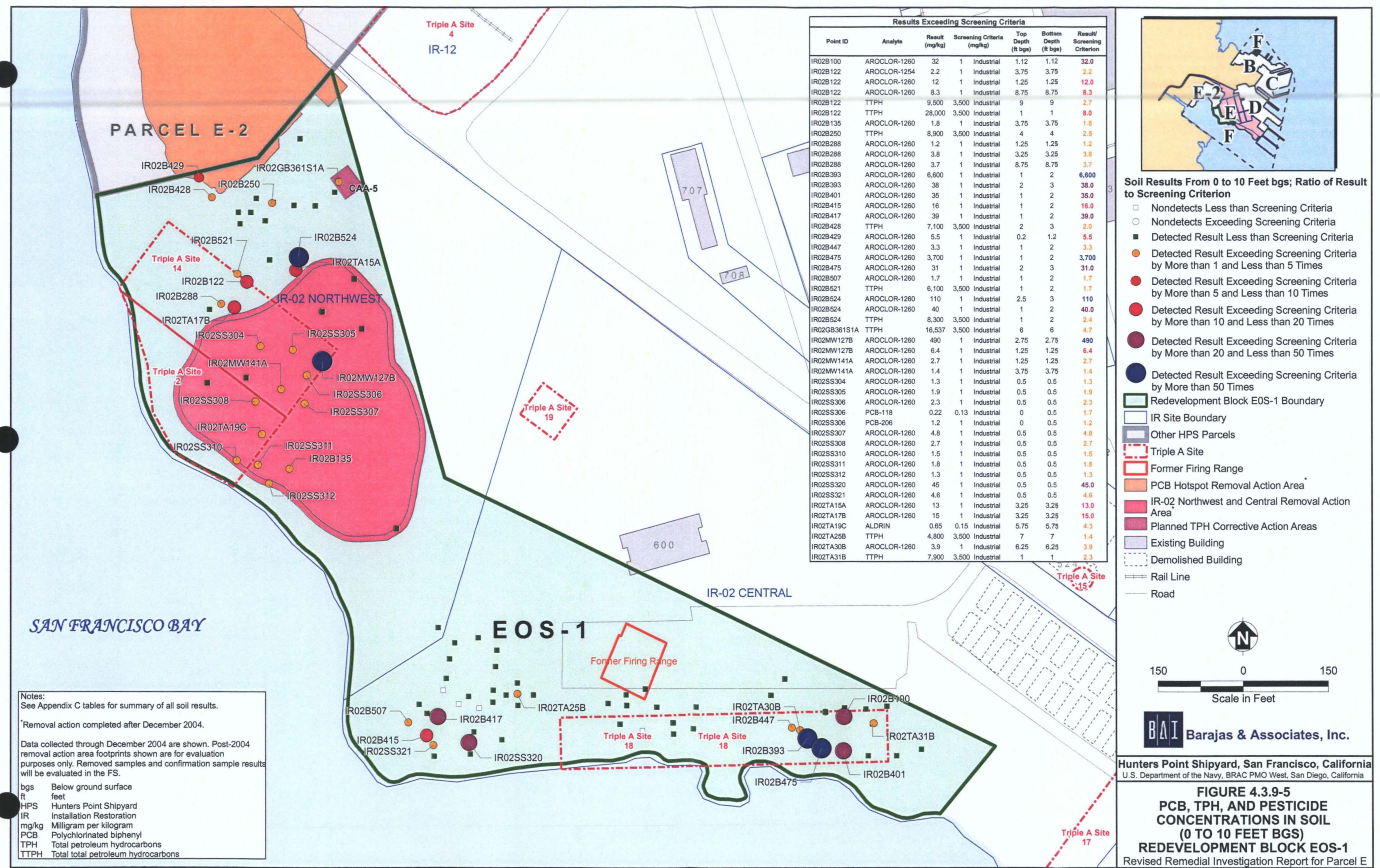
Removal action completed after December 2004.

Data collected through December 2004 are shown. Post-2004 removal action area footprints shown are for evaluation purposes only. Removed samples and confirmation sample results will be evaluated in the FS.

bgs Below ground surface
ft Feet
HPAL Hunters Point ambient level
HPS Hunters Point Shipyard
IR Installation Restoration
mg/kg Milligram per kilogram
PCB Polychlorinated biphenyl
TPH Total petroleum hydrocarbon







Results Exceeding Screening Criteria							
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion	
IR02B100	AROCLOR-1260	32	1	Industrial	1.12	1.12	32.0
IR02B122	AROCLOR-1254	2.2	1	Industrial	3.75	3.75	2.2
IR02B122	AROCLOR-1260	12	1	Industrial	1.25	1.25	12.0
IR02B122	AROCLOR-1260	8.3	1	Industrial	8.75	8.75	8.3
IR02B122	TTPH	9,500	3,500	Industrial	9	9	2.7
IR02B122	TTPH	28,000	3,500	Industrial	1	1	8.0
IR02B135	AROCLOR-1260	1.8	1	Industrial	3.75	3.75	1.8
IR02B250	TTPH	8,900	3,500	Industrial	4	4	2.5
IR02B288	AROCLOR-1260	1.2	1	Industrial	1.25	1.25	1.2
IR02B288	AROCLOR-1260	3.8	1	Industrial	3.25	3.25	3.8
IR02B288	AROCLOR-1260	3.7	1	Industrial	8.75	8.75	3.7
IR02B393	AROCLOR-1260	6,600	1	Industrial	1	2	6,600
IR02B393	AROCLOR-1260	38	1	Industrial	2	3	38.0
IR02B401	AROCLOR-1260	35	1	Industrial	1	2	35.0
IR02B415	AROCLOR-1260	16	1	Industrial	1	2	16.0
IR02B417	AROCLOR-1260	39	1	Industrial	1	2	39.0
IR02B428	TTPH	7,100	3,500	Industrial	2	3	2.0
IR02B429	AROCLOR-1260	5.5	1	Industrial	0.2	1.2	5.5
IR02B447	AROCLOR-1260	3.3	1	Industrial	1	2	3.3
IR02B475	AROCLOR-1260	3,700	1	Industrial	1	2	3,700
IR02B475	AROCLOR-1260	31	1	Industrial	2	3	31.0
IR02B507	AROCLOR-1260	1.7	1	Industrial	1	2	1.7
IR02B521	TTPH	6,100	3,500	Industrial	1	2	1.7
IR02B524	AROCLOR-1260	110	1	Industrial	2.5	3	110
IR02B524	AROCLOR-1260	40	1	Industrial	1	2	40.0
IR02B524	TTPH	8,300	3,500	Industrial	1	2	2.4
IR02GB361S1A	TTPH	16,537	3,500	Industrial	6	6	4.7
IR02MW127B	AROCLOR-1260	490	1	Industrial	2.75	2.75	490
IR02MW127B	AROCLOR-1260	6.4	1	Industrial	1.25	1.25	6.4
IR02MW141A	AROCLOR-1260	2.7	1	Industrial	1.25	1.25	2.7
IR02MW141A	AROCLOR-1260	1.4	1	Industrial	3.75	3.75	1.4
IR02SS304	AROCLOR-1260	1.3	1	Industrial	0.5	0.5	1.3
IR02SS305	AROCLOR-1260	1.9	1	Industrial	0.5	0.5	1.9
IR02SS306	AROCLOR-1260	2.3	1	Industrial	0.5	0.5	2.3
IR02SS306	PCB-118	0.22	0.13	Industrial	0	0.5	1.7
IR02SS306	PCB-206	1.2	1	Industrial	0	0.5	1.2
IR02SS307	AROCLOR-1260	4.8	1	Industrial	0.5	0.5	4.8
IR02SS308	AROCLOR-1260	2.7	1	Industrial	0.5	0.5	2.7
IR02SS310	AROCLOR-1260	1.5	1	Industrial	0.5	0.5	1.5
IR02SS311	AROCLOR-1260	1.8	1	Industrial	0.5	0.5	1.8
IR02SS312	AROCLOR-1260	1.3	1	Industrial	0.5	0.5	1.3
IR02SS320	AROCLOR-1260	45	1	Industrial	0.5	0.5	45.0
IR02SS321	AROCLOR-1260	4.6	1	Industrial	0.5	0.5	4.6
IR02TA15A	AROCLOR-1260	13	1	Industrial	3.25	3.25	13.0
IR02TA17B	AROCLOR-1260	15	1	Industrial	3.25	3.25	15.0
IR02TA19C	ALDRIN	0.85	0.15	Industrial	5.75	5.75	4.3
IR02TA25B	TTPH	4,800	3,500	Industrial	7	7	1.4
IR02TA30B	AROCLOR-1260	3.9	1	Industrial	6.25	6.25	3.9
IR02TA31B	TTPH	7,900	3,500	Industrial	1	1	2.3

Notes:
See Appendix C tables for summary of all soil results.
Removal action completed after December 2004.
Data collected through December 2004 are shown. Post-2004 removal action area footprints shown are for evaluation purposes only. Removed samples and confirmation sample results will be evaluated in the FS.

bgs Below ground surface
ft feet
HPS Hunters Point Shipyard
IR Installation Restoration
mg/kg Milligram per kilogram
PCB Polychlorinated biphenyl
TPH Total petroleum hydrocarbons
TTPH Total total petroleum hydrocarbons

Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times

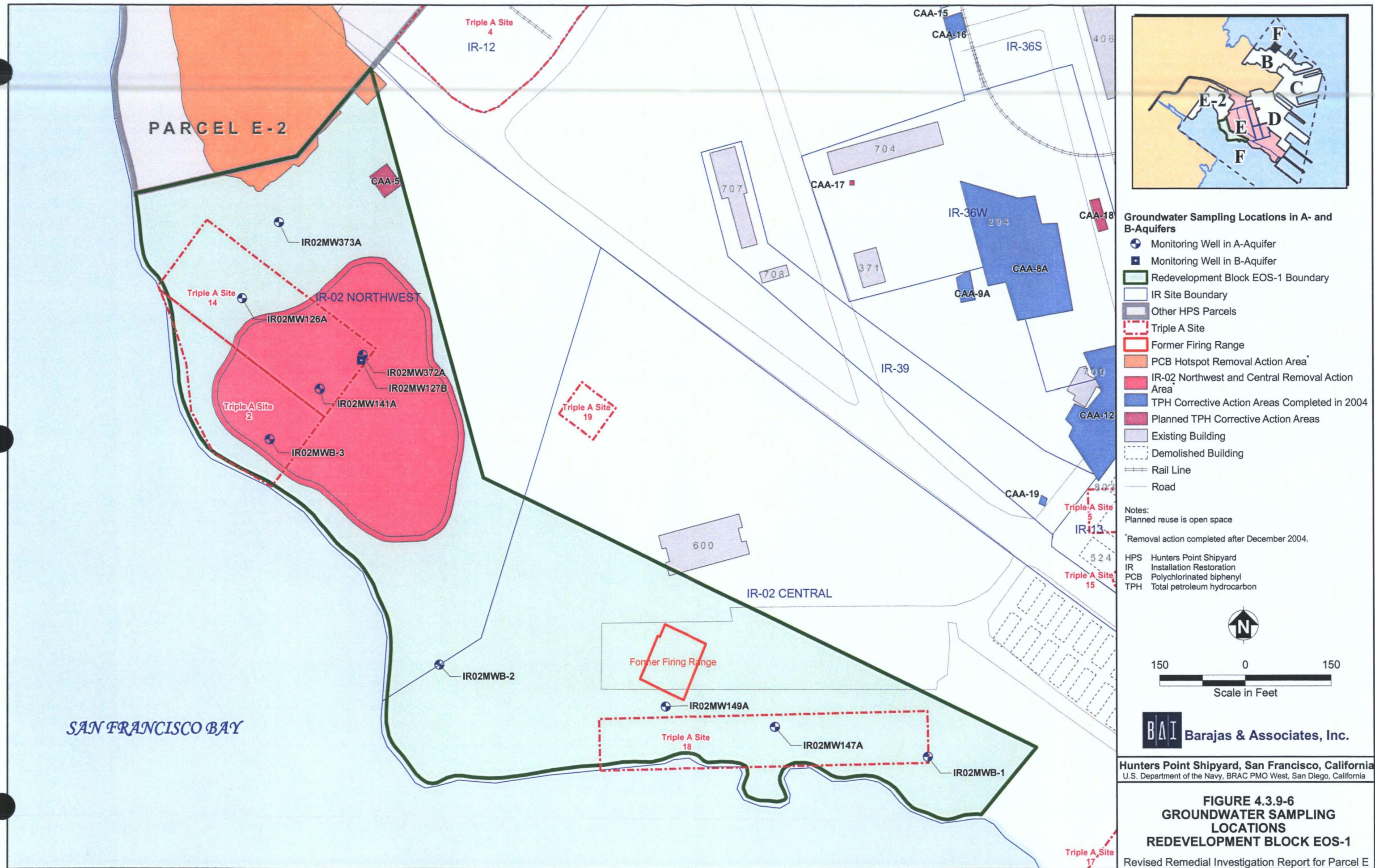
Redevelopment Block EOS-1 Boundary
IR Site Boundary
Other HPS Parcels
Triple A Site
Former Firing Range
PCB Hotspot Removal Action Area
IR-02 Northwest and Central Removal Action Area
Planned TPH Corrective Action Areas
Existing Building
Demolished Building
Rail Line
Road

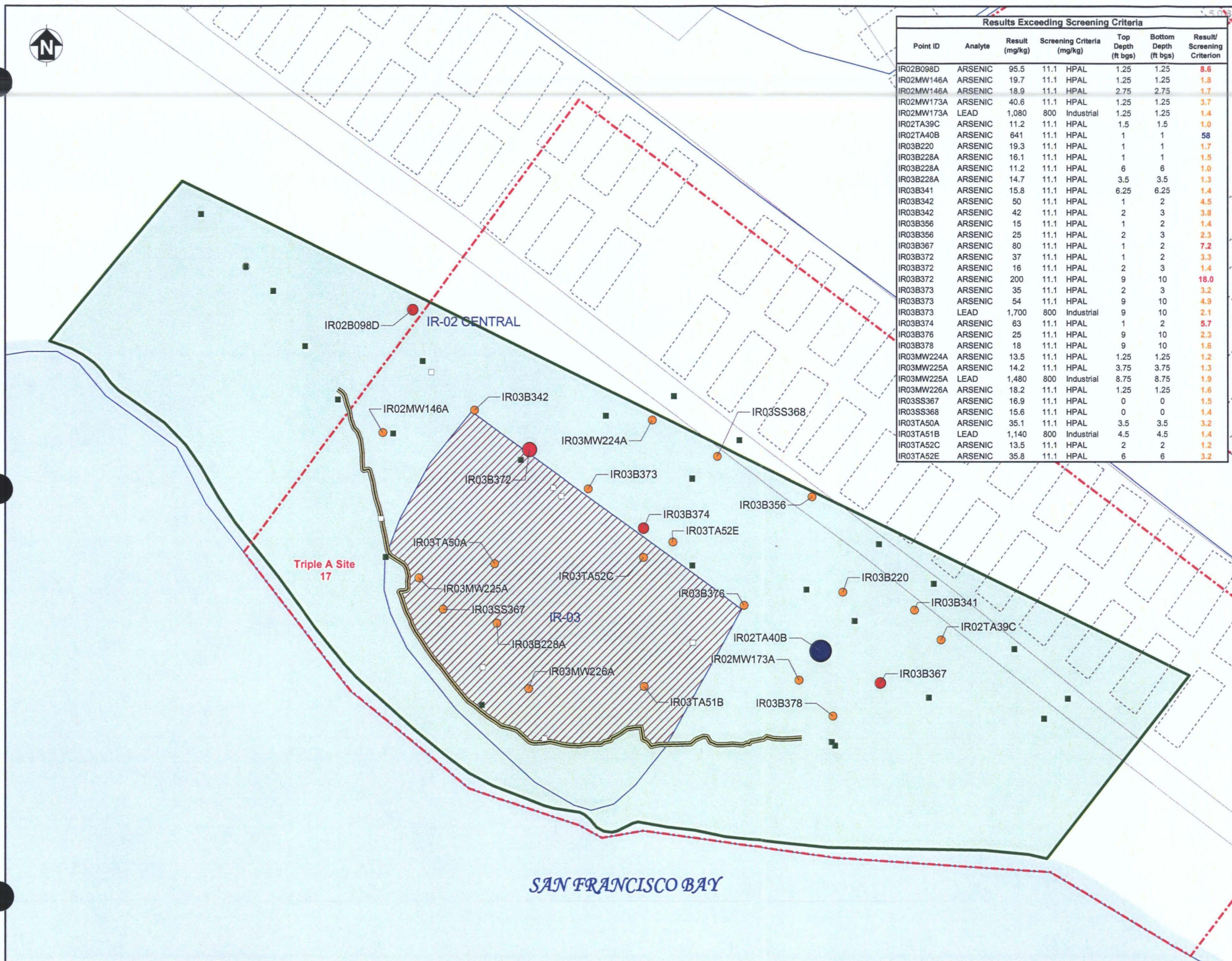
Scale in Feet

BAI Barajas & Associates, Inc.

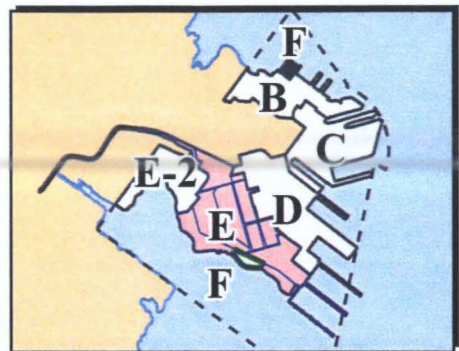
Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 4.3.9-5
PCB, TPH, AND PESTICIDE
CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK EOS-1
Revised Remedial Investigation Report for Parcel E





Results Exceeding Screening Criteria							
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion	
IR02B098D	ARSENIC	95.5	11.1	HPAL	1.25	1.25	8.6
IR02MW146A	ARSENIC	19.7	11.1	HPAL	1.25	1.25	1.8
IR02MW146A	ARSENIC	18.9	11.1	HPAL	2.75	2.75	1.7
IR02MW173A	ARSENIC	40.6	11.1	HPAL	1.25	1.25	3.7
IR02MW173A	LEAD	1,080	800	Industrial	1.25	1.25	1.4
IR02TA39C	ARSENIC	11.2	11.1	HPAL	1.5	1.5	1.0
IR02TA40B	ARSENIC	641	11.1	HPAL	1	1	58
IR03B220	ARSENIC	19.3	11.1	HPAL	1	1	1.7
IR03B228A	ARSENIC	16.1	11.1	HPAL	1	1	1.5
IR03B228A	ARSENIC	11.2	11.1	HPAL	6	6	1.0
IR03B228A	ARSENIC	14.7	11.1	HPAL	3.5	3.5	1.3
IR03B341	ARSENIC	15.8	11.1	HPAL	6.25	6.25	1.4
IR03B342	ARSENIC	50	11.1	HPAL	1	2	4.5
IR03B342	ARSENIC	42	11.1	HPAL	2	3	3.8
IR03B356	ARSENIC	15	11.1	HPAL	1	2	1.4
IR03B356	ARSENIC	25	11.1	HPAL	2	3	2.3
IR03B367	ARSENIC	80	11.1	HPAL	1	2	7.2
IR03B372	ARSENIC	37	11.1	HPAL	1	2	3.3
IR03B372	ARSENIC	16	11.1	HPAL	2	3	1.4
IR03B372	ARSENIC	200	11.1	HPAL	9	10	18.0
IR03B373	ARSENIC	35	11.1	HPAL	2	3	3.2
IR03B373	ARSENIC	54	11.1	HPAL	9	10	4.9
IR03B373	LEAD	1,700	800	Industrial	9	10	2.1
IR03B374	ARSENIC	63	11.1	HPAL	1	2	5.7
IR03B376	ARSENIC	25	11.1	HPAL	9	10	2.3
IR03B378	ARSENIC	18	11.1	HPAL	9	10	1.6
IR03MW224A	ARSENIC	13.5	11.1	HPAL	1.25	1.25	1.2
IR03MW225A	ARSENIC	14.2	11.1	HPAL	3.75	3.75	1.3
IR03MW225A	LEAD	1,480	800	Industrial	8.75	8.75	1.9
IR03MW226A	ARSENIC	18.2	11.1	HPAL	1.25	1.25	1.6
IR03SS367	ARSENIC	16.9	11.1	HPAL	0	0	1.5
IR03SS368	ARSENIC	15.6	11.1	HPAL	0	0	1.4
IR03TA50A	ARSENIC	35.1	11.1	HPAL	3.5	3.5	3.2
IR03TA51B	LEAD	1,140	800	Industrial	4.5	4.5	1.4
IR03TA52C	ARSENIC	13.5	11.1	HPAL	2	2	1.2
IR03TA52E	ARSENIC	35.8	11.1	HPAL	6	6	3.2



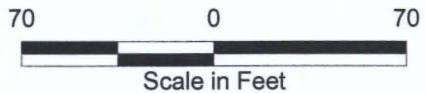
Soil Results From 0 to 10 feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times

- Sheetpile Wall
- Road
- Redevelopment Block EOS-2 Boundary
- IR Site Boundary
- Triple A Site
- Geosynthetic Liner
- Demolished Building

Notes:
See Appendix C tables for summary of all soil results.
Soil borings shown on this figure are included in the data set for Redevelopment Block EOS-2 based on the boundaries of the HHRA grids associated with Redevelopment Block EOS-2.

bgs Below ground surface
ft Feet
HHRA Human health risk assessment
HPAL Hunters Point ambient level
IR Installation Restoration
mg/kg Milligram per kilogram

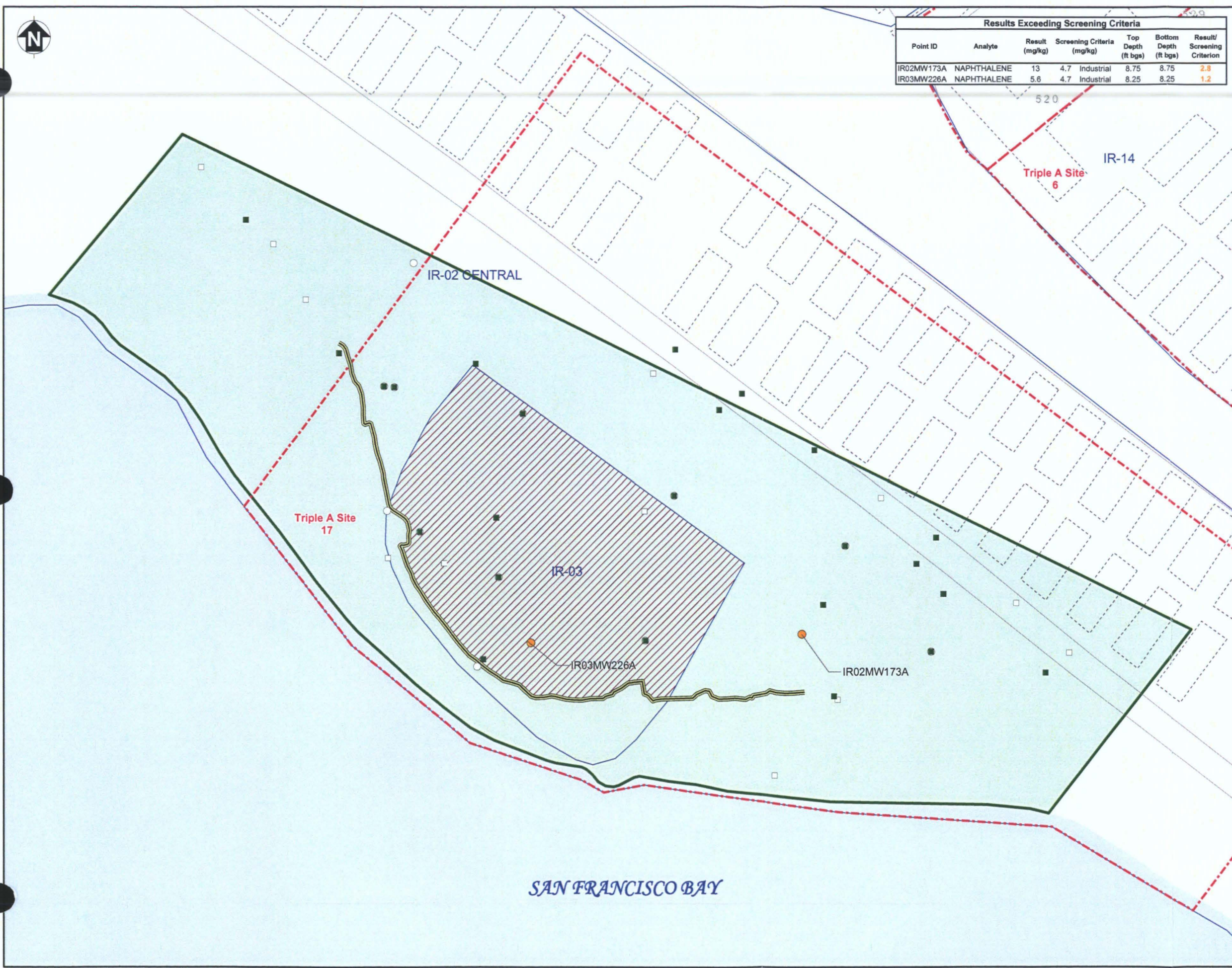


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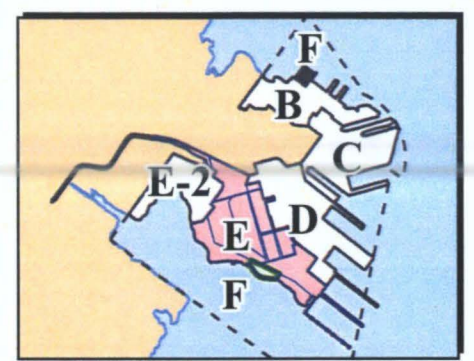
Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 4.3.10-2

METALS CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK EOS-2
Revised Remedial Investigation Report for Parcel E



Results Exceeding Screening Criteria						
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion
IR02MW173A	NAPHTHALENE	13	4.7 Industrial	8.75	8.75	2.8
IR03MW226A	NAPHTHALENE	5.6	4.7 Industrial	8.25	8.25	1.2

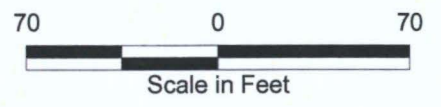


Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- Sheetpile Wall
- Road
- Redevelopment Block EOS-2 Boundary
- IR Site Boundary
- Triple A Site
- Geosynthetic Liner
- Demolished Building

Notes:
See Appendix C tables for summary of all soil results.
Soil borings shown on this figure are included in the data set for Redevelopment Block EOS-2 based on the boundaries of the HHRA grids associated with Redevelopment Block EOS-2.

bgs Below ground surface
ft Feet
HHRA Human health risk assessment
IR Installation Restoration
mg/kg Milligram per kilogram
VOC Volatile organic compound

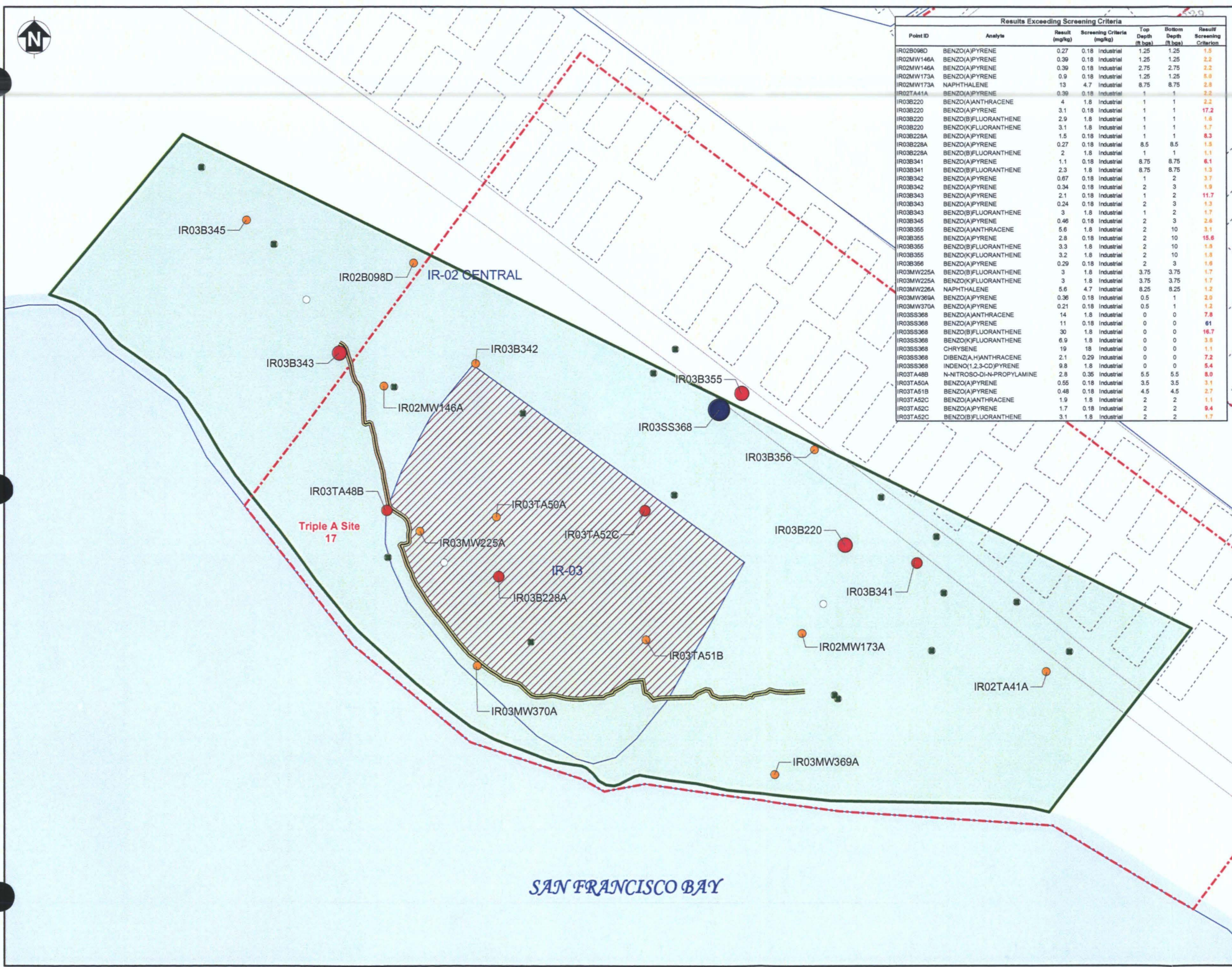


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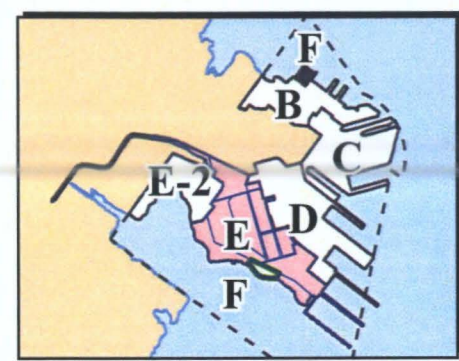
Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 4.3.10-3

**VOC CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK EOS-2
Revised Remedial Investigation Report for Parcel E**



Results Exceeding Screening Criteria						
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion
IR02B098D	BENZO(A)PYRENE	0.27	0.18	Industrial	1.25	1.5
IR02MW146A	BENZO(A)PYRENE	0.39	0.18	Industrial	1.25	2.2
IR02MW146A	BENZO(A)PYRENE	0.39	0.18	Industrial	2.75	2.2
IR02MW173A	BENZO(A)PYRENE	0.9	0.18	Industrial	1.25	5.0
IR02MW173A	NAPHTHALENE	13	4.7	Industrial	8.75	2.8
IR02TA41A	BENZO(A)PYRENE	0.39	0.18	Industrial	1	2.2
IR03B220	BENZO(A)ANTHRACENE	4	1.8	Industrial	1	2.2
IR03B220	BENZO(A)PYRENE	3.1	0.18	Industrial	1	17.2
IR03B220	BENZO(B)FLUORANTHENE	2.9	1.8	Industrial	1	1.6
IR03B220	BENZO(K)FLUORANTHENE	3.1	1.8	Industrial	1	1.7
IR03B228A	BENZO(A)PYRENE	1.5	0.18	Industrial	1	8.3
IR03B228A	BENZO(A)PYRENE	0.27	0.18	Industrial	8.5	1.5
IR03B228A	BENZO(B)FLUORANTHENE	2	1.8	Industrial	1	1.1
IR03B341	BENZO(A)PYRENE	1.1	0.18	Industrial	8.75	6.1
IR03B341	BENZO(B)FLUORANTHENE	2.3	1.8	Industrial	8.75	1.3
IR03B342	BENZO(A)PYRENE	0.67	0.18	Industrial	1	3.7
IR03B342	BENZO(A)PYRENE	0.34	0.18	Industrial	2	1.9
IR03B343	BENZO(A)PYRENE	2.1	0.18	Industrial	1	11.7
IR03B343	BENZO(A)PYRENE	0.24	0.18	Industrial	2	1.3
IR03B343	BENZO(B)FLUORANTHENE	3	1.8	Industrial	1	1.7
IR03B345	BENZO(A)PYRENE	0.46	0.18	Industrial	2	2.6
IR03B355	BENZO(A)ANTHRACENE	5.6	1.8	Industrial	2	3.1
IR03B355	BENZO(B)FLUORANTHENE	2.8	0.18	Industrial	2	15.6
IR03B355	BENZO(K)FLUORANTHENE	3.3	1.8	Industrial	2	1.8
IR03B355	BENZO(K)FLUORANTHENE	3.2	1.8	Industrial	2	1.8
IR03B356	BENZO(A)PYRENE	0.29	0.18	Industrial	2	1.6
IR03MW225A	BENZO(B)FLUORANTHENE	3	1.8	Industrial	3.75	1.7
IR03MW225A	BENZO(K)FLUORANTHENE	3	1.8	Industrial	3.75	1.7
IR03MW225A	NAPHTHALENE	5.6	4.7	Industrial	8.25	1.2
IR03MW369A	BENZO(A)PYRENE	0.36	0.18	Industrial	0.5	2.0
IR03MW370A	BENZO(A)PYRENE	0.21	0.18	Industrial	0.5	1.2
IR03SS368	BENZO(A)ANTHRACENE	14	1.8	Industrial	0	7.8
IR03SS368	BENZO(A)PYRENE	11	0.18	Industrial	0	61
IR03SS368	BENZO(B)FLUORANTHENE	30	1.8	Industrial	0	16.7
IR03SS368	BENZO(K)FLUORANTHENE	6.9	1.8	Industrial	0	3.8
IR03SS368	CHRYSENE	19	18	Industrial	0	1.1
IR03SS368	DIBENZO(A,H)ANTHRACENE	2.1	0.29	Industrial	0	7.2
IR03SS368	INDENO(1,2,3-CD)PYRENE	9.8	1.8	Industrial	0	5.4
IR03TA48B	N-NITROSO-DI-N-PROPYLAMINE	2.8	0.35	Industrial	5.5	8.0
IR03TA50A	BENZO(A)PYRENE	0.55	0.18	Industrial	3.5	3.1
IR03TA51B	BENZO(A)PYRENE	0.48	0.18	Industrial	4.5	2.7
IR03TA52C	BENZO(A)ANTHRACENE	1.9	1.8	Industrial	2	1.1
IR03TA52C	BENZO(A)PYRENE	1.7	0.18	Industrial	2	9.4
IR03TA52C	BENZO(B)FLUORANTHENE	3.1	1.8	Industrial	2	1.7



Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times

— Sheetpile Wall
— Road
— Redevelopment Block EOS-2 Boundary
— IR Site Boundary
— Triple A Site
— Geosynthetic Liner
— Demolished Building

Notes:
See Appendix C tables for summary of all soil results.
Soil borings shown on this figure are included in the data set for Redevelopment Block EOS-2 based on the boundaries of the HHRA grids associated with Redevelopment Block EOS-2.

bgs Below ground surface
ft Feet
HHRA Human health risk assessment
IR Installation Restoration
mg/kg Milligram per kilogram
SVOC Semivolatile organic compound

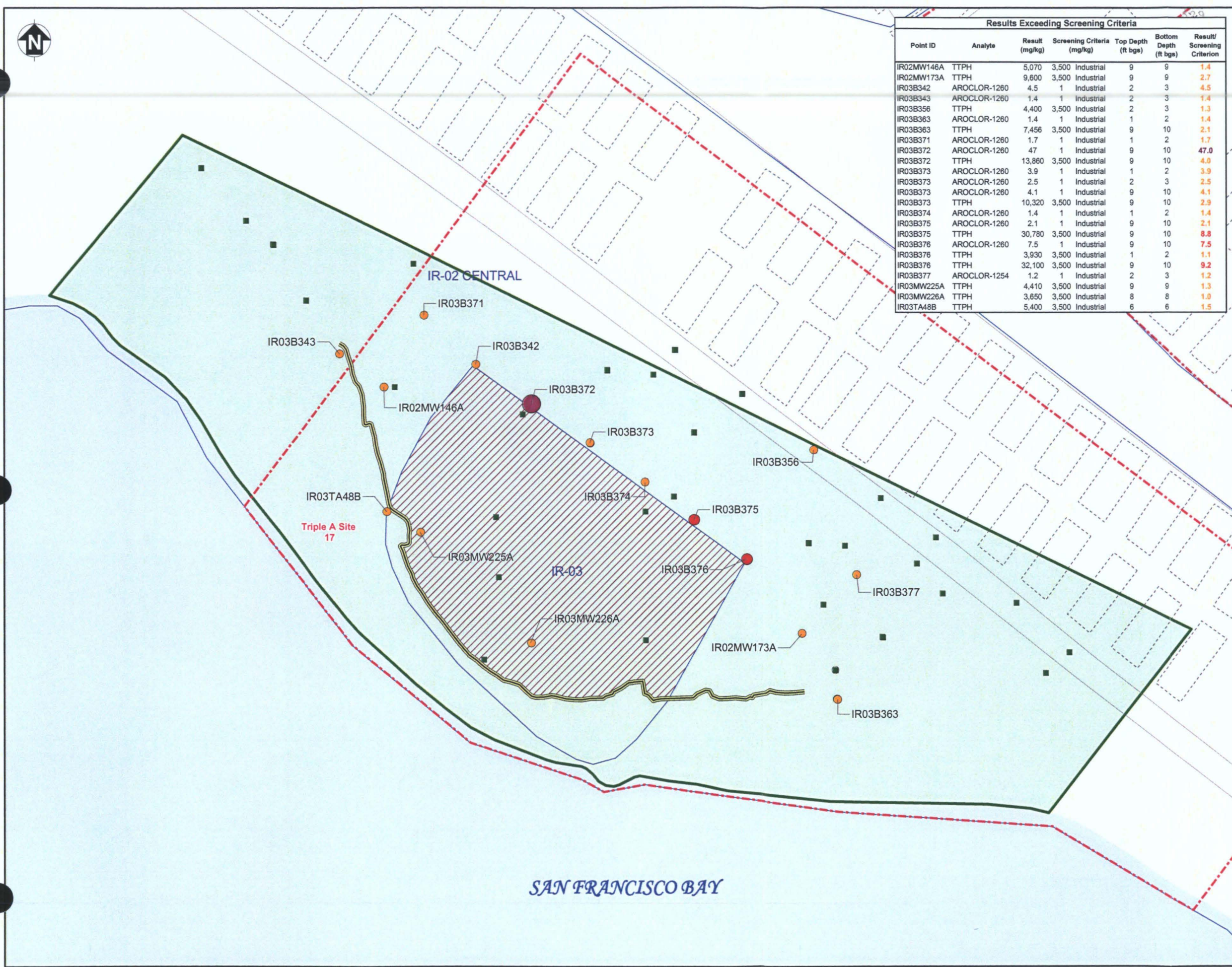
70 0 70
Scale in Feet

BAI Barajas & Associates, Inc.

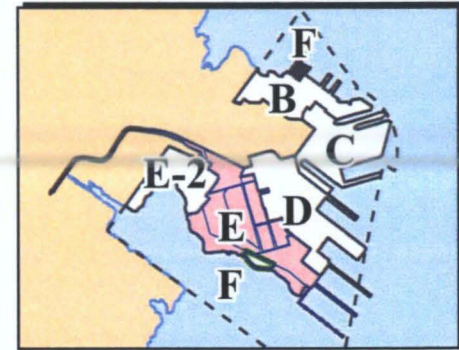
Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 4.3.10-4

**SVOC CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK EOS-2**
Revised Remedial Investigation Report for Parcel E



Results Exceeding Screening Criteria							
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion	
IR02MW146A	TTPH	5,070	3,500 Industrial	9	9	1.4	
IR02MW173A	TTPH	9,600	3,500 Industrial	9	9	2.7	
IR03B342	AROCOR-1260	4.5	1 Industrial	2	3	4.5	
IR03B343	AROCOR-1260	1.4	1 Industrial	2	3	1.4	
IR03B356	TTPH	4,400	3,500 Industrial	2	3	1.3	
IR03B363	AROCOR-1260	1.4	1 Industrial	1	2	1.4	
IR03B363	TTPH	7,456	3,500 Industrial	9	10	2.1	
IR03B371	AROCOR-1260	1.7	1 Industrial	1	2	1.7	
IR03B372	AROCOR-1260	47	1 Industrial	9	10	47.0	
IR03B372	TTPH	13,860	3,500 Industrial	9	10	4.0	
IR03B373	AROCOR-1260	3.9	1 Industrial	1	2	3.9	
IR03B373	AROCOR-1260	2.5	1 Industrial	2	3	2.5	
IR03B373	AROCOR-1260	4.1	1 Industrial	9	10	4.1	
IR03B373	TTPH	10,320	3,500 Industrial	9	10	2.9	
IR03B374	AROCOR-1260	1.4	1 Industrial	1	2	1.4	
IR03B375	AROCOR-1260	2.1	1 Industrial	9	10	2.1	
IR03B375	TTPH	30,780	3,500 Industrial	9	10	8.8	
IR03B376	AROCOR-1260	7.5	1 Industrial	9	10	7.5	
IR03B376	TTPH	3,930	3,500 Industrial	1	2	1.1	
IR03B376	TTPH	32,100	3,500 Industrial	9	10	9.2	
IR03B377	AROCOR-1254	1.2	1 Industrial	2	3	1.2	
IR03MW225A	TTPH	4,410	3,500 Industrial	9	9	1.3	
IR03MW226A	TTPH	3,650	3,500 Industrial	8	8	1.0	
IR03TA48B	TTPH	5,400	3,500 Industrial	6	6	1.5	

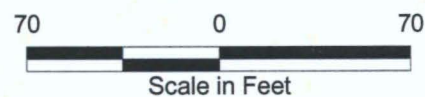


Soil Results From 0 to 10 feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- Sheetpile Wall
- Road
- Redevelopment Block EOS-2 Boundary
- IR Site Boundary
- Triple A Site
- Geosynthetic Liner
- Demolished Building

Notes:
See Appendix C tables for summary of all soil results.
Soil borings shown on this figure are included in the data set for Redevelopment Block EOS-2 based on the boundaries of the HHRA grids associated with Redevelopment Block EOS-2.

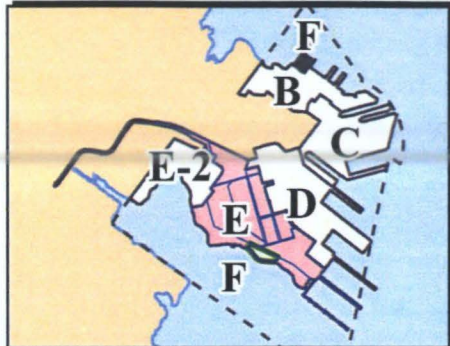
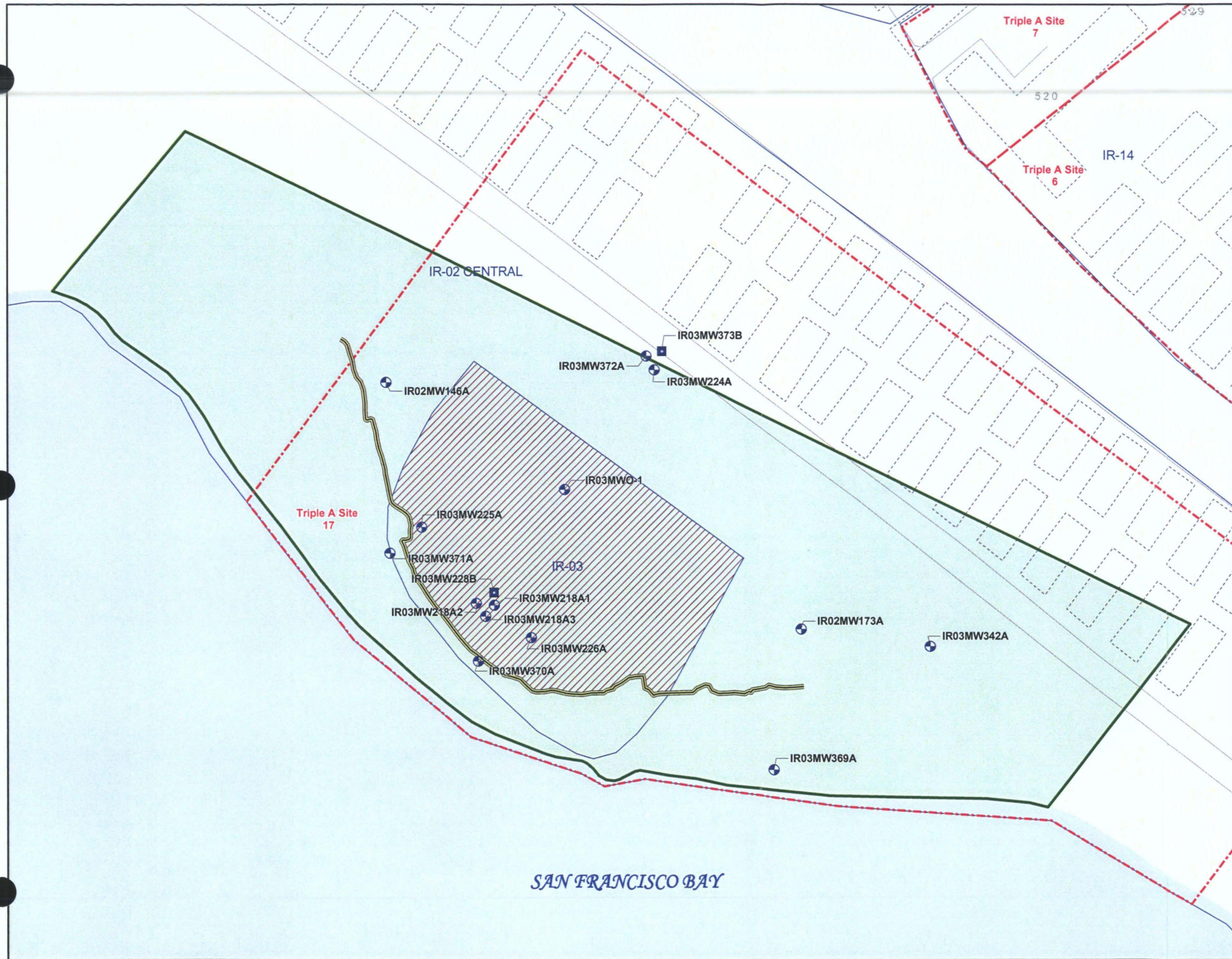
bgs Below ground surface
ft Feet
HHRA Human health risk assessment
IR Installation Restoration
mg/kg Milligram per kilogram
PCB Polychlorinated biphenyl
TPH Total petroleum hydrocarbon
TTPH Total total petroleum hydrocarbon



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Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 4.3.10-5
PCB AND TPH
CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK EOS-2
Revised Remedial Investigation Report for Parcel E

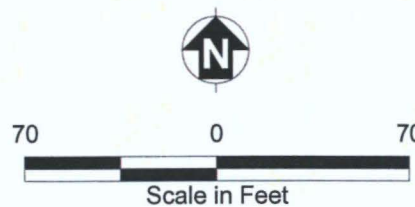


Groundwater Sampling Locations in A- and B-Aquifers

- Monitoring Well in A-Aquifer
- Monitoring Well in B-Aquifer
- Sheetpile Wall
- Road
- Redevelopment Block EOS-2 Boundary
- IR Site Boundary
- - - Triple A Site
- / / / Geosynthetic Liner
- - - Demolished Building

Notes:
Planned reuse is open space

IR Installation Restoration



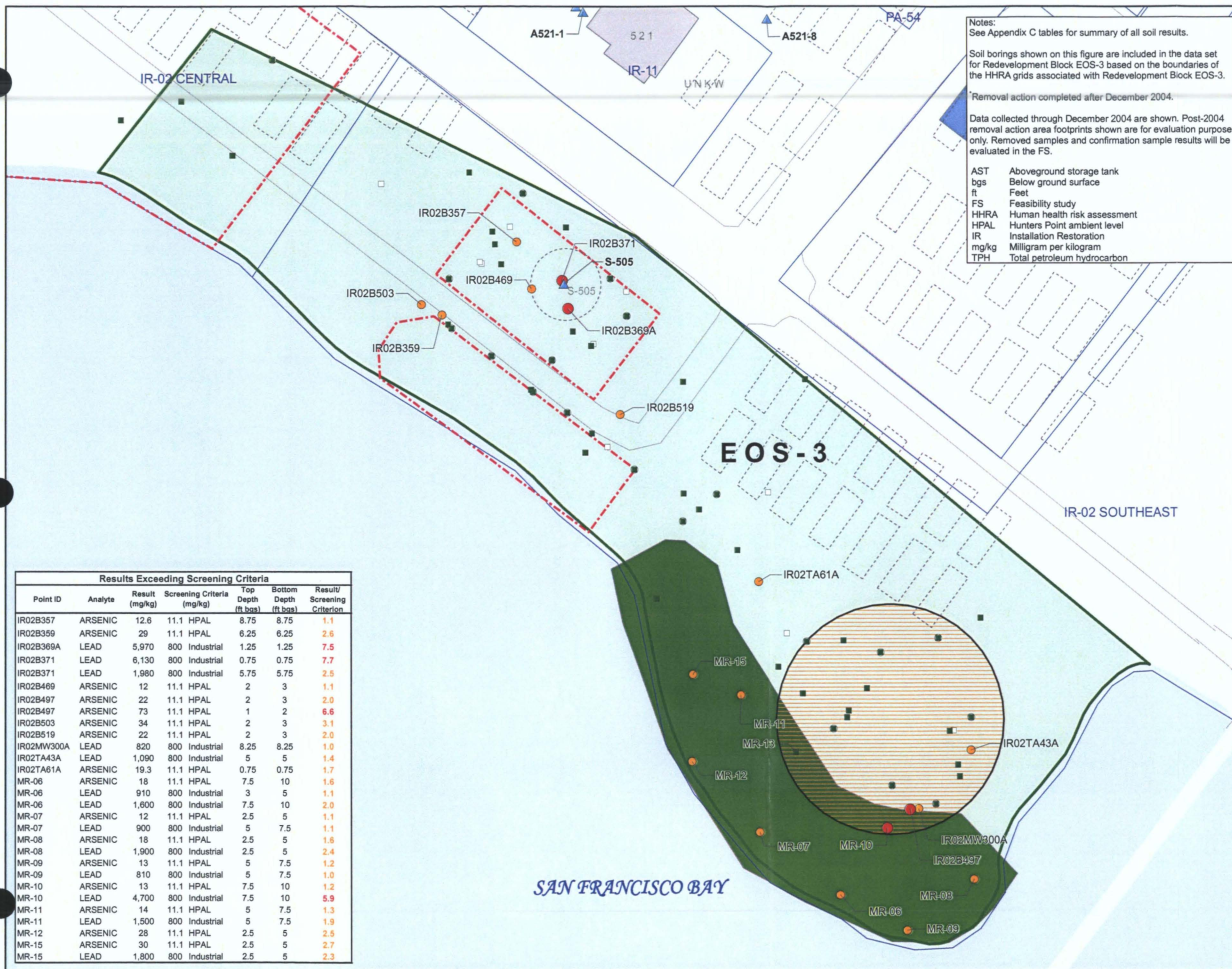
BAI Barajas & Associates, Inc.

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 4.3.10-6
GROUNDWATER SAMPLING LOCATIONS
REDEVELOPMENT BLOCK EOS-2

Revised Remedial Investigation Report for Parcel E





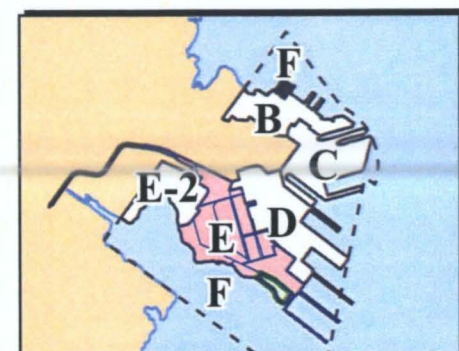
Notes:
See Appendix C tables for summary of all soil results.

Soil borings shown on this figure are included in the data set for Redevelopment Block EOS-3 based on the boundaries of the HHRA grids associated with Redevelopment Block EOS-3.

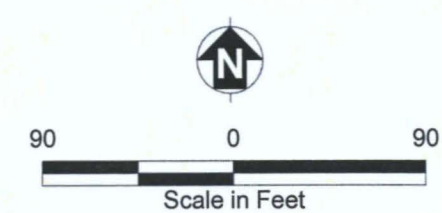
*Removal action completed after December 2004.

Data collected through December 2004 are shown. Post-2004 removal action area footprints shown are for evaluation purposes only. Removed samples and confirmation sample results will be evaluated in the FS.

AST Aboveground storage tank
bgs Below ground surface
ft Feet
FS Feasibility study
HHRA Human health risk assessment
HPAL Hunters Point ambient level
IR Installation Restoration
mg/kg Milligram per kilogram
TPH Total petroleum hydrocarbon



- Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion**
- Nondetects Less than Screening Criteria
 - Nondetects Exceeding Screening Criteria
 - Detected Result Less than Screening Criteria
 - Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
 - Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
 - Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
 - Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
 - Detected Result Exceeding Screening Criteria by More than 50 Times
 - ▲ Removed AST
 - Redevelopment Block EOS-3 Boundary
 - IR Site Boundary
 - Triple A Site
 - Burn Disposal Area
 - Metal Debris Reef Removal Action Area
 - TPH Corrective Action Areas Completed in 2004
 - Existing Building
 - Demolished Building
 - Road



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FIGURE 4.3.11-2

**METALS CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK EOS-3
Revised Remedial Investigation Report for Parcel E**



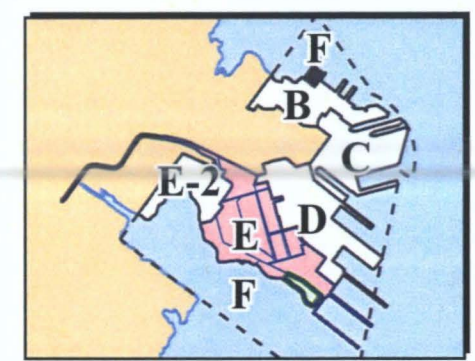
Notes:
See Appendix C tables for summary of all soil results.

Soil borings shown on this figure are included in the data set for Redevelopment Block EOS-3 based on the boundaries of the HHRA grids associated with Redevelopment Block EOS-3.

*Removal action completed after December 2004.

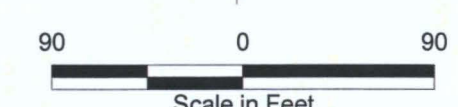
Data collected through December 2004 are shown. Post-2004 removal action area footprints shown are for evaluation purposes only. Removed samples and confirmation sample results will be evaluated in the FS.

AST Aboveground storage tank
bgs Below ground surface
ft Feet
FS Feasibility study
HHRA Human health risk assessment
IR Installation Restoration
mg/kg Milligram per kilogram
TPH Total petroleum hydrocarbon
VOC Volatile organic compound



Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- ▲ Removed AST
- ▭ Redevelopment Block EOS-3 Boundary
- ▭ IR Site Boundary
- ▭ Triple A Site
- ▭ Burn Disposal Area
- ▭ Metal Debris Reef Removal Action Area
- ▭ TPH Corrective Action Areas Completed in 2004
- ▭ Existing Building
- ▭ Demolished Building
- ▭ Road



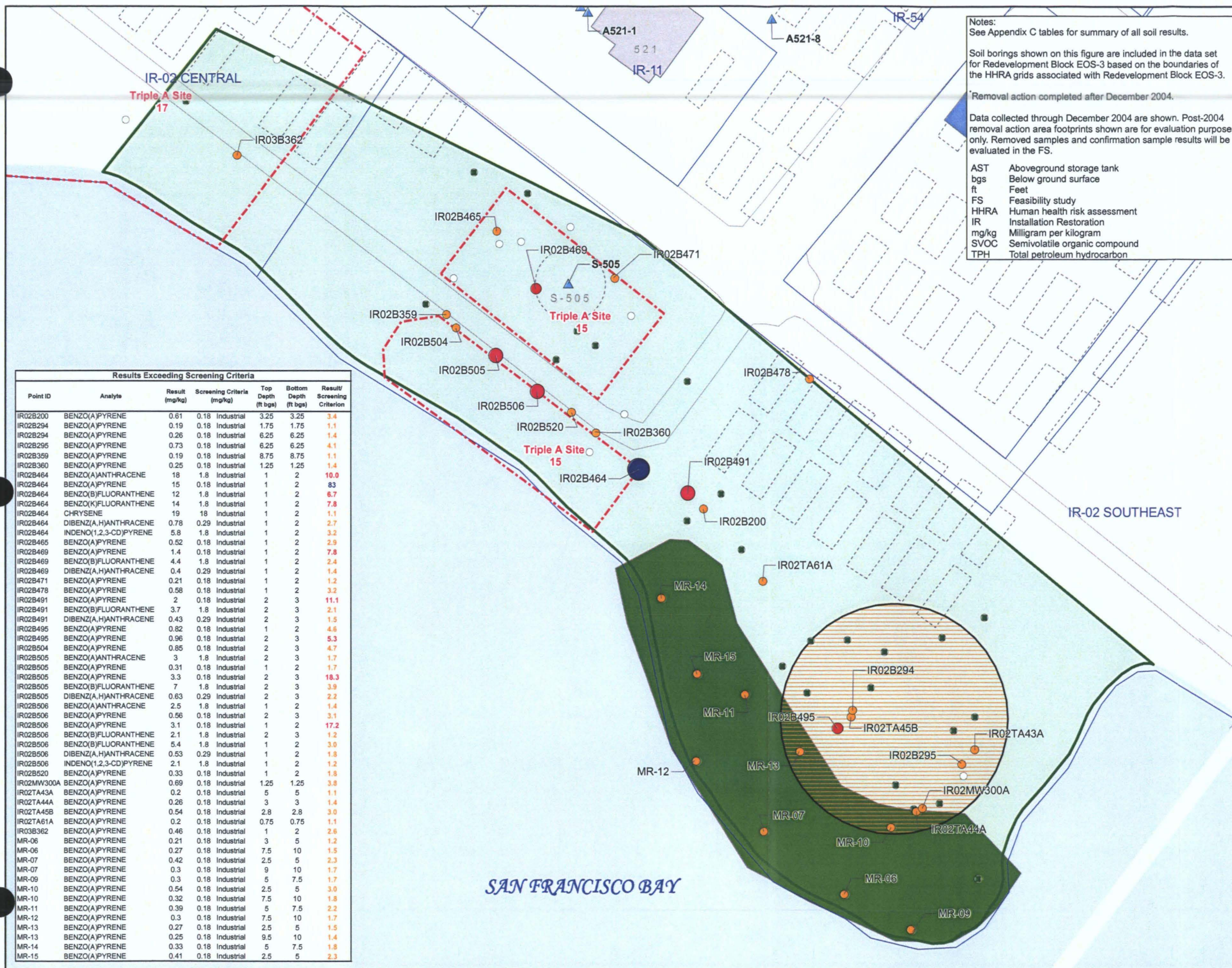
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FIGURE 4.3.11-3

**VOC CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK EOS-3**
Revised Remedial Investigation Report for Parcel E

Results Exceeding Screening Criteria						
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion
IR02B355	NAPHTHALENE	5.5	4.7 Industrial	6.25	6.25	1.2
IR02B464	NAPHTHALENE	6.2	4.7 Industrial	1	2	1.3
IR02TA42A	NAPHTHALENE	7.4	4.7 Industrial	4.5	4.5	1.6
IR02TA43A	NAPHTHALENE	4.9	4.7 Industrial	5	5	1.0
IR02TA45B	NAPHTHALENE	5.7	4.7 Industrial	2.8	2.8	1.2



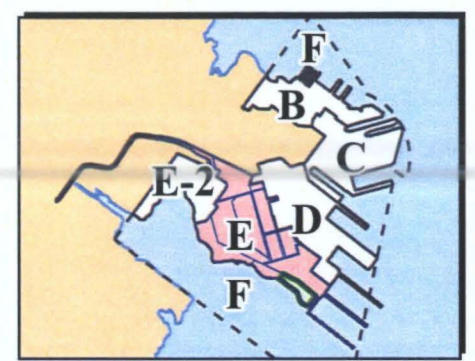
Notes:
See Appendix C tables for summary of all soil results.

Soil borings shown on this figure are included in the data set for Redevelopment Block EOS-3 based on the boundaries of the HHRA grids associated with Redevelopment Block EOS-3.

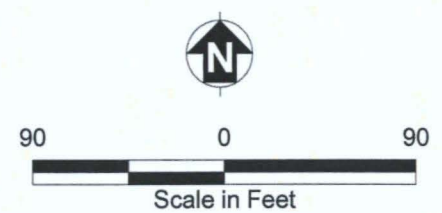
Removal action completed after December 2004.

Data collected through December 2004 are shown. Post-2004 removal action area footprints shown are for evaluation purposes only. Removed samples and confirmation sample results will be evaluated in the FS.

AST Aboveground storage tank
bgs Below ground surface
ft Feet
FS Feasibility study
HHRA Human health risk assessment
IR Installation Restoration
mg/kg Milligram per kilogram
SVOC Semivolatile organic compound
TPH Total petroleum hydrocarbon

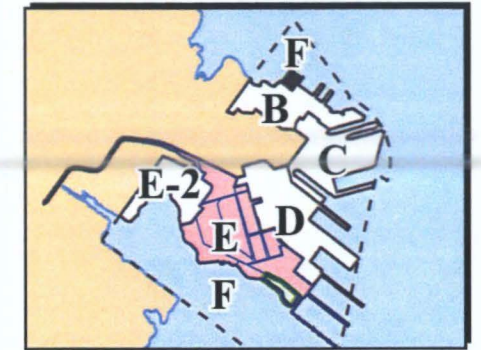
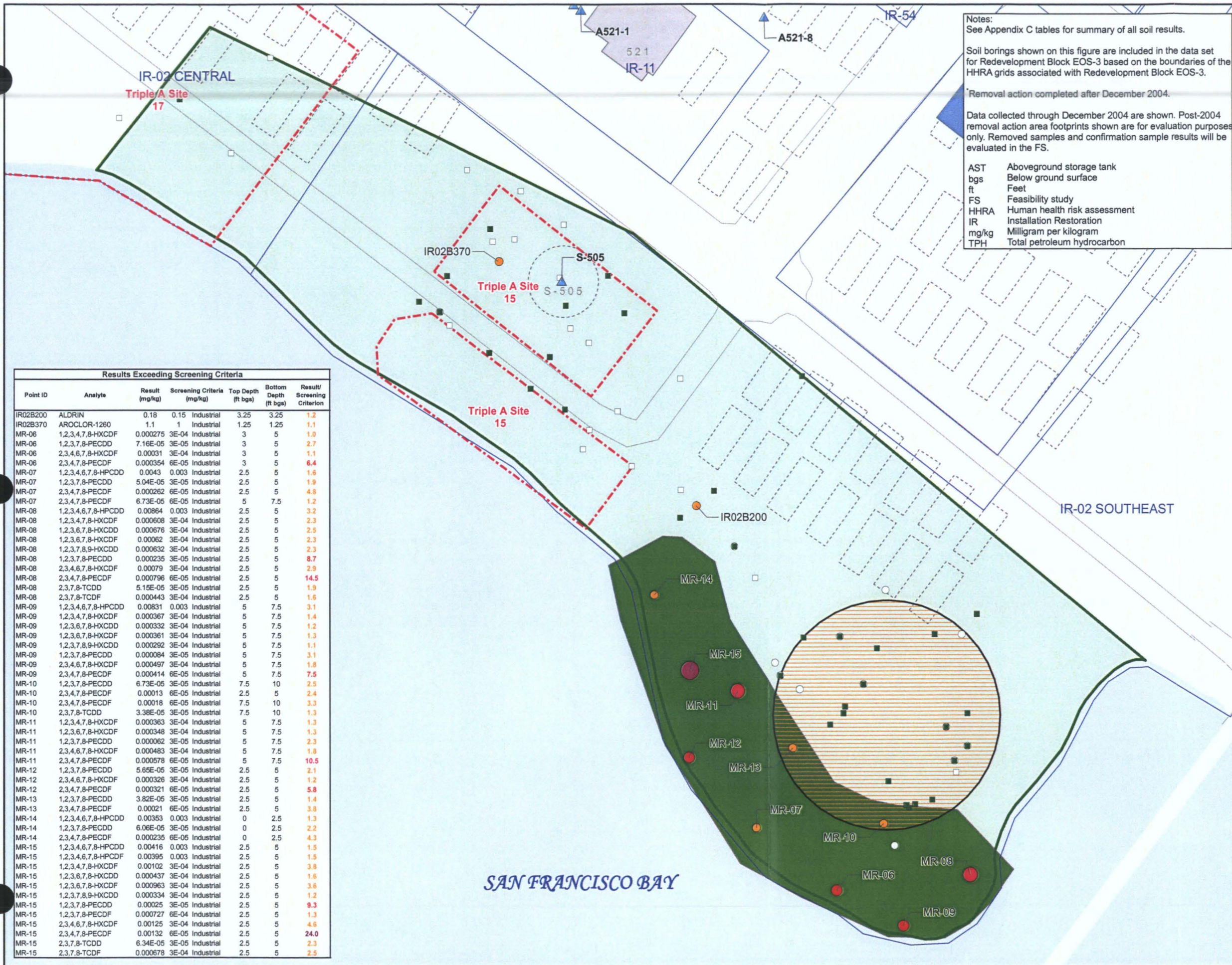


- Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion**
- Nondetects Less than Screening Criteria
 - Nondetects Exceeding Screening Criteria
 - Detected Result Less than Screening Criteria
 - Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
 - Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
 - Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
 - Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
 - Detected Result Exceeding Screening Criteria by More than 50 Times
 - ▲ Removed AST
 - Redevelopment Block EOS-3 Boundary
 - IR Site Boundary
 - Triple A Site
 - Burn Disposal Area
 - Metal Debris Reef Removal Action Area
 - TPH Corrective Action Areas Completed in 2004
 - Existing Building
 - Demolished Building
 - Road



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FIGURE 4.3.11-4
SVOC CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK EOS-3
Revised Remedial Investigation Report for Parcel E



Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- ▲ Removed AST
- Redevelopment Block EOS-3 Boundary
- IR Site Boundary
- Triple A Site
- Burn Disposal Area
- Metal Debris Reef Removal Action Area
- TPH Corrective Action Areas Completed in 2004
- Existing Building
- Demolished Building
- Road

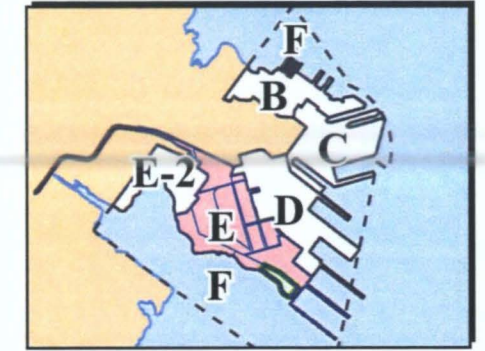
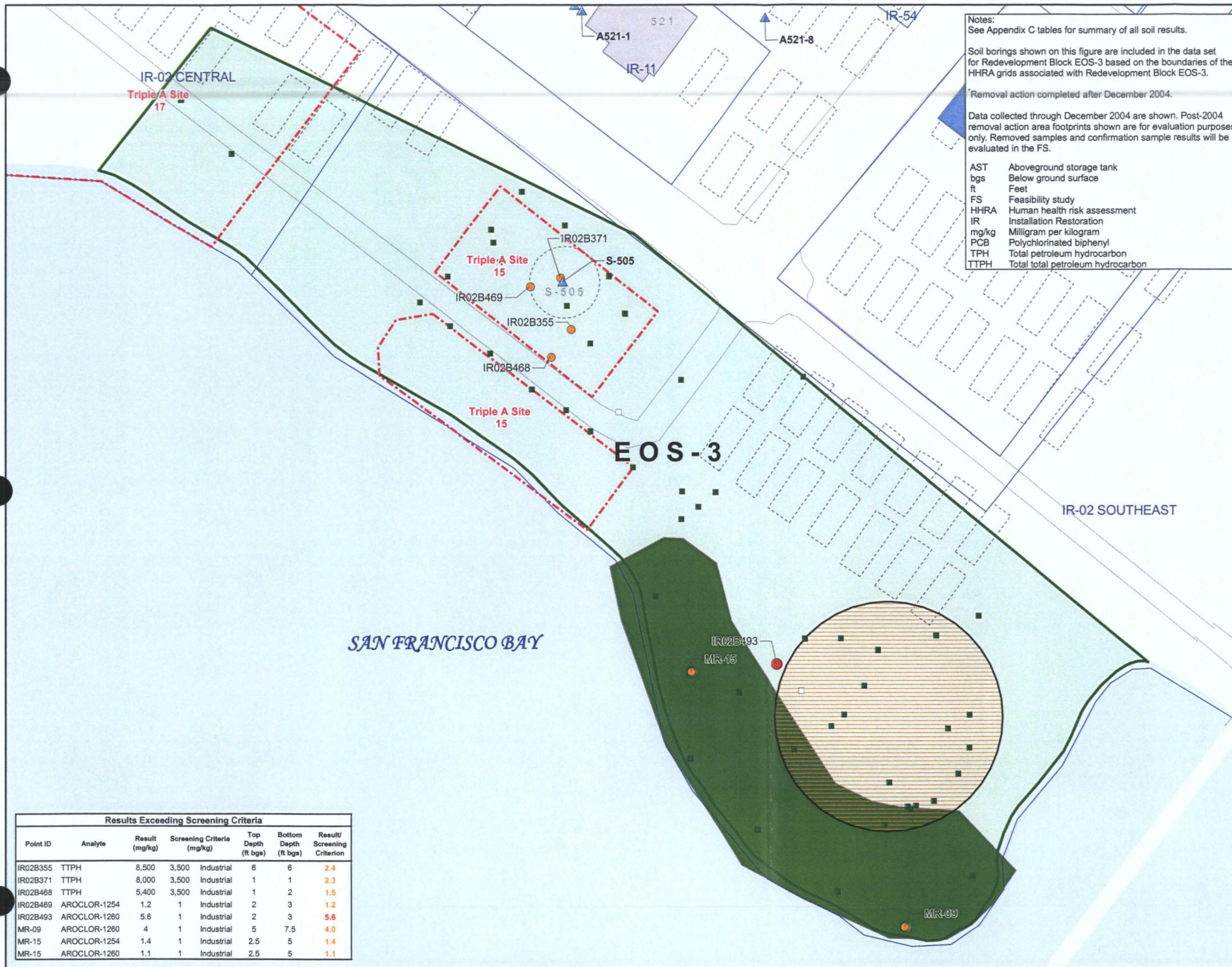


90 0 90
Scale in Feet

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FIGURE 4.3.11-5
PESTICIDE AND DIOXIN/FURAN
CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK EOS-3
Revised Remedial Investigation Report for Parcel E



Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- ▲ Removed AST
- ▭ Redevelopment Block EOS-3 Boundary
- ▭ IR Site Boundary
- ▭ Triple A Site
- ▭ Burn Disposal Area
- ▭ Metal Debris Reef Removal Action Area
- ▭ TPH Corrective Action Areas Completed in 2004
- ▭ Existing Building
- ▭ Demolished Building
- ▭ Road



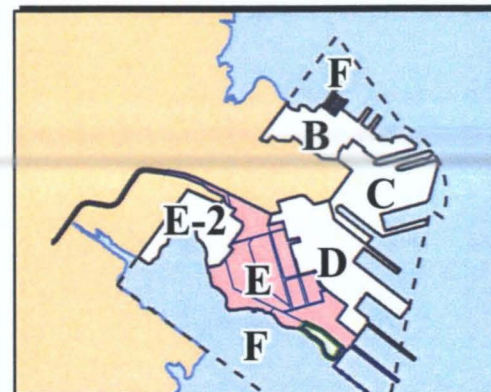
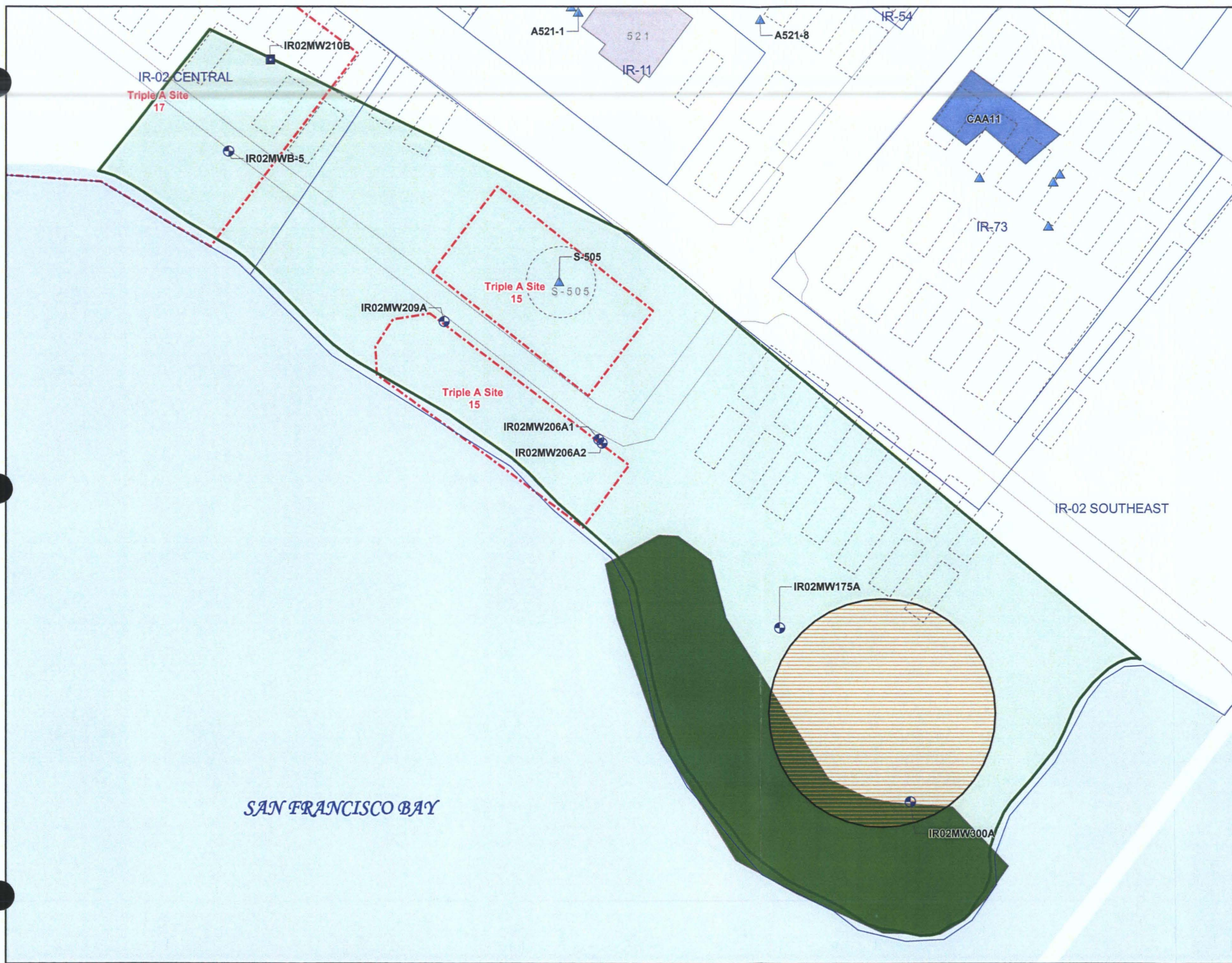
90 0 90
Scale in Feet

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FIGURE 4.3.11-6
PCB AND TPH
CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK EOS-3
Revised Remedial Investigation Report for Parcel E

Results Exceeding Screening Criteria						
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion
IR02B355	TPH	8,500	3,500 Industrial	6	6	2.4
IR02B371	TPH	8,000	3,500 Industrial	1	1	2.3
IR02B468	TPH	5,400	3,500 Industrial	1	2	1.5
IR02B469	AROCOR-1254	1.2	1 Industrial	2	3	1.2
IR02B493	AROCOR-1260	5.6	1 Industrial	2	3	5.6
MR-09	AROCOR-1260	4	1 Industrial	5	7.5	4.0
MR-15	AROCOR-1254	1.4	1 Industrial	2.5	5	1.4
MR-15	AROCOR-1260	1.1	1 Industrial	2.5	5	1.1



Groundwater Sampling Locations in A- and B-Aquifers

- Monitoring Well in A-Aquifer
- Monitoring Well in B-Aquifer
- Removed AST
- Redevelopment Block EOS-3 Boundary
- IR Site Boundary
- Triple A Site
- Burn Disposal Area
- Metal Debris Reef Removal Action Area*
- TPH Corrective Action Areas Completed in 2004
- Existing Building
- Demolished Building
- Road

Notes:
Planned reuse is open space

*Removal action completed after December 2004.

AST Aboveground storage tank
IR Installation Restoration
TPH Total petroleum hydrocarbon



90 0 90
Scale in Feet

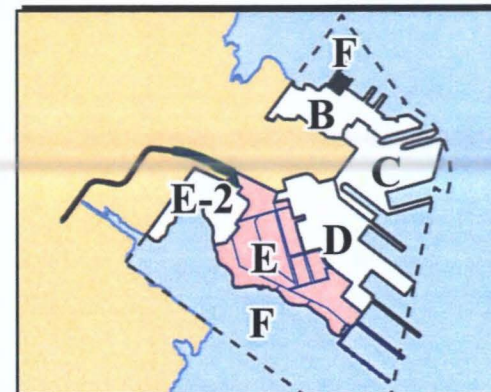
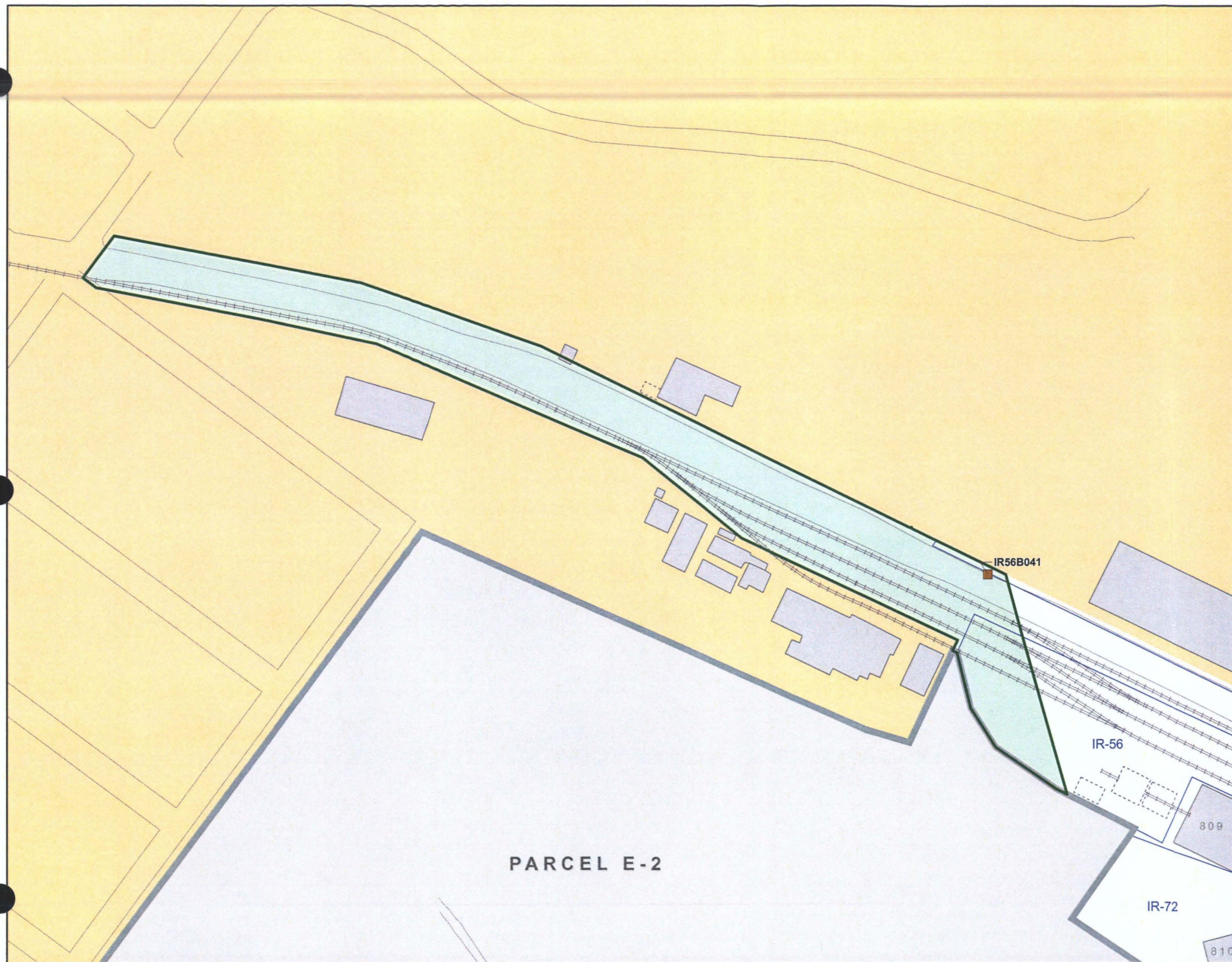
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FIGURE 4.3.11-7

GROUNDWATER SAMPLING LOCATIONS REDEVELOPMENT BLOCK EOS-3

Revised Remedial Investigation Report for Parcel E



- Soil Sampling Location 0 to 10 feet bgs
- Redevelopment Block EOS-4 Boundary
- IR Site Boundary
- Other HPS Parcels
- Non-Navy Property
- Existing Building
- Demolished Building
- Road
- Rail Line

Notes:
 Planned reuse is open space
 bgs Below ground surface
 HPS Hunters Point Shipyard
 IR Installation Restoration



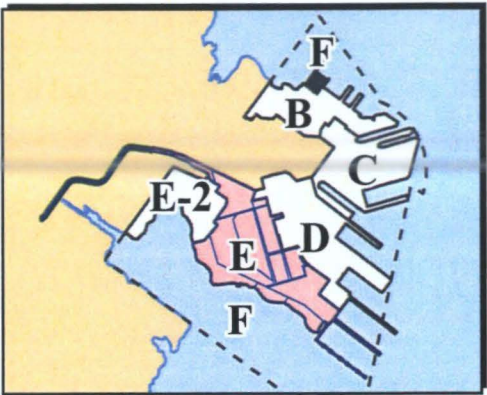
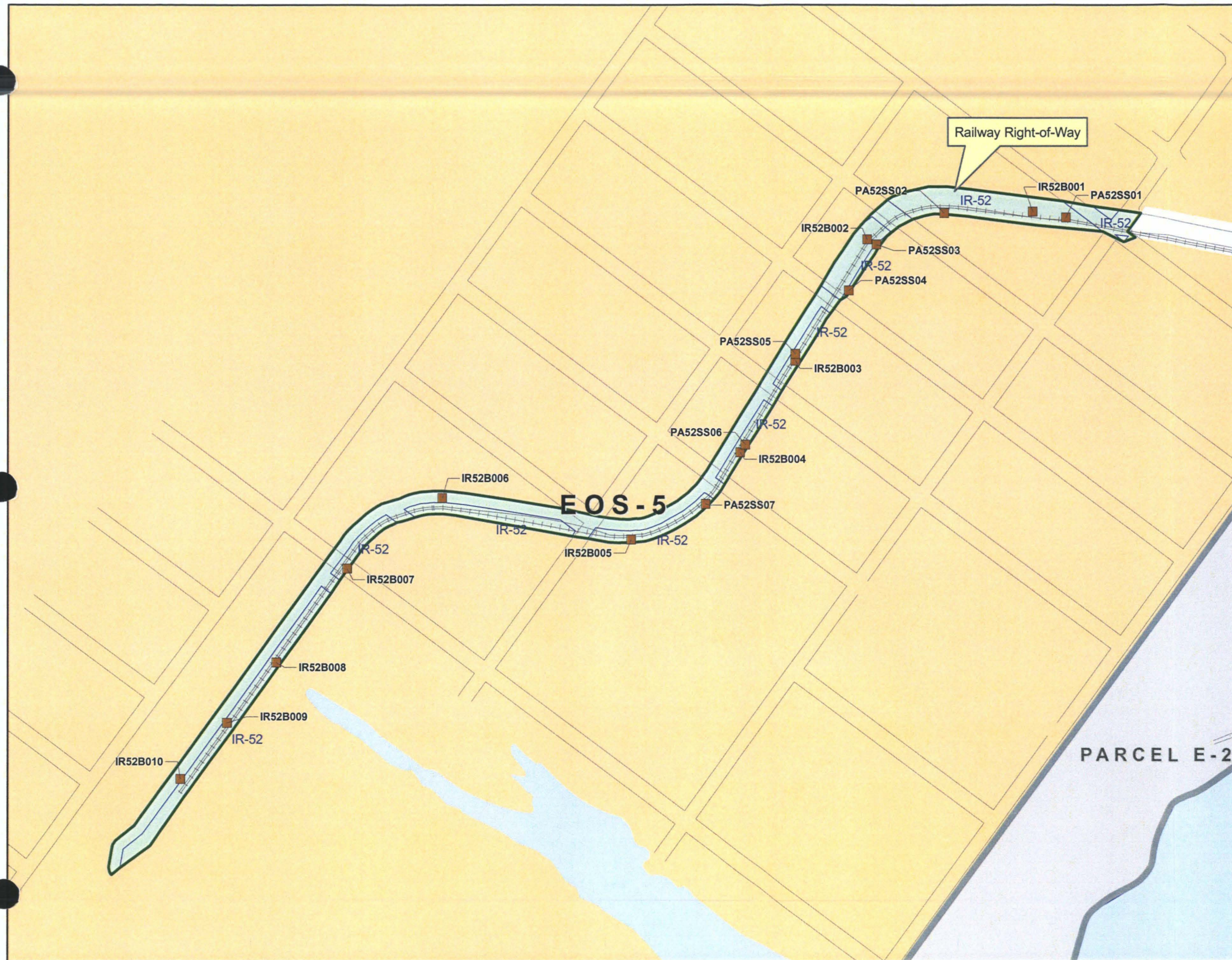
150 0 150
 Scale in Feet

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FIGURE 4.3.12-1

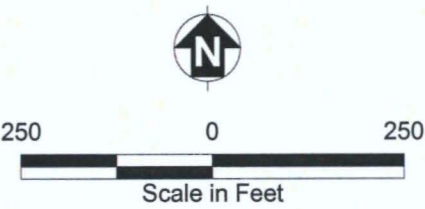
**SOIL SAMPLING LOCATIONS
 (0 TO 10 FEET BGS)
 REDEVELOPMENT BLOCK EOS-4
 Revised Remedial Investigation Report for Parcel E**



- Soil Sampling Location 0 to 10 feet bgs
- Redevelopment Block EOS-5 Boundary
- IR Site Boundary
- Other HPS Parcels
- Non-Navy Property
- Rail Line
- Road

Notes:
Planned reuse is open space

HPS Hunters Point Shipyard
IR Installation Restoration



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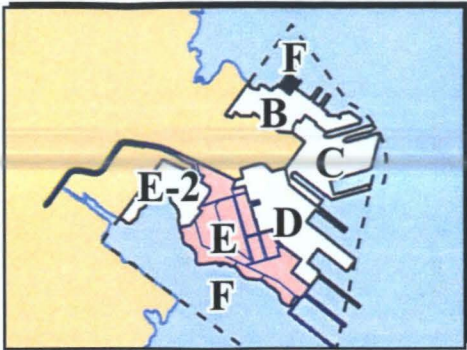
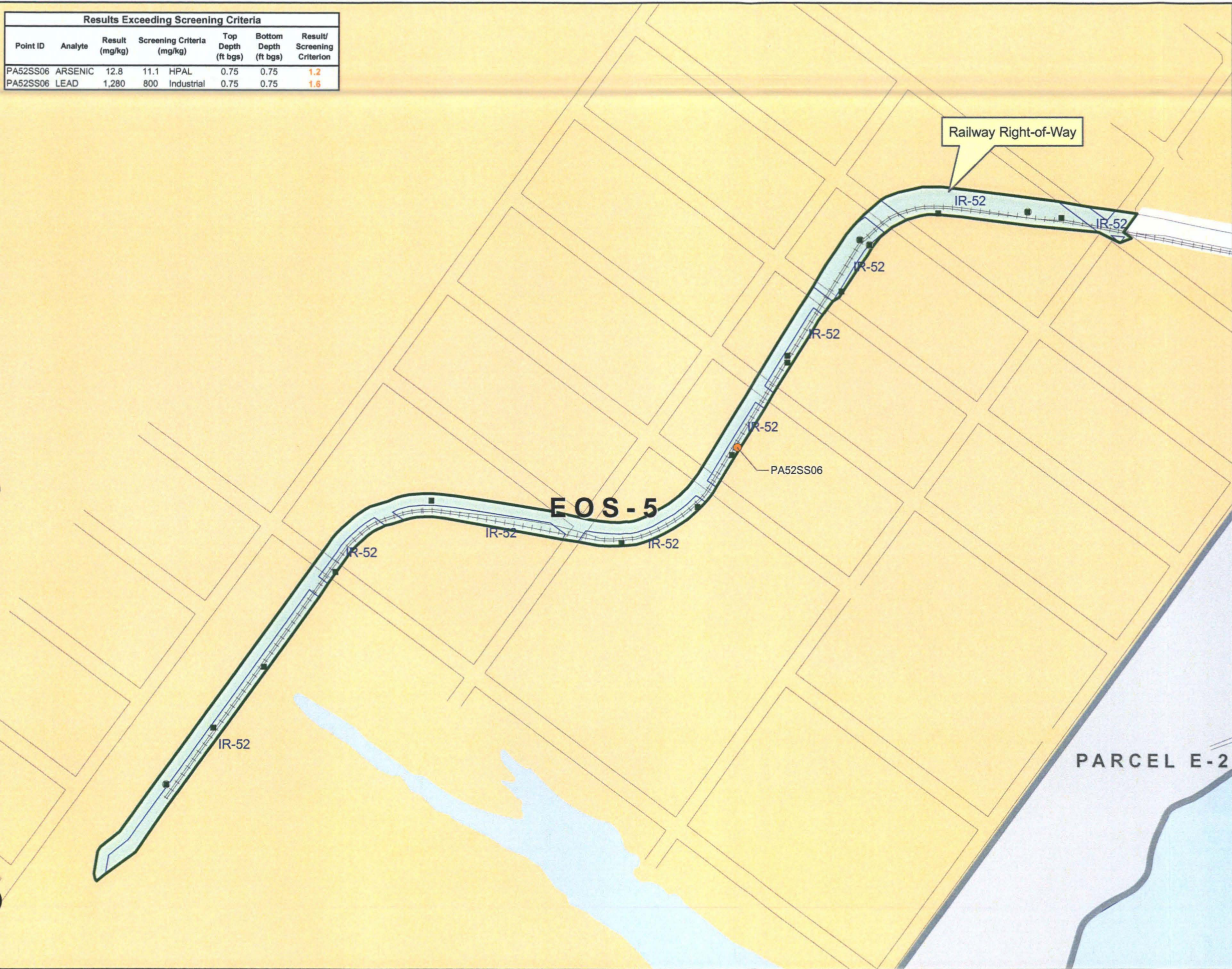
Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 4.3.13-1

**SOIL SAMPLING LOCATIONS
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK EOS-5**

Revised Remedial Investigation Report for Parcel E

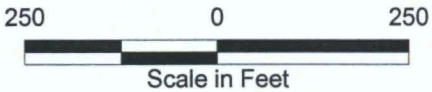
Results Exceeding Screening Criteria						
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/Screening Criterion
PA52SS06	ARSENIC	12.8	11.1 HPAL	0.75	0.75	1.2
PA52SS06	LEAD	1,280	800 Industrial	0.75	0.75	1.6



Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- Redevelopment Block EOS-5 Boundary
- IR Site Boundary
- Other HPS Parcels
- Non-Navy Property
- Rail Line
- Road

Notes:
Planned reuse is open space
bgs Below ground surface
ft Feet
HPS Hunters Point Shipyard
IR Installation Restoration



BAI Barajas & Associates, Inc.

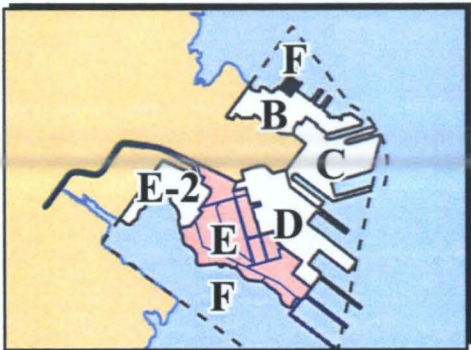
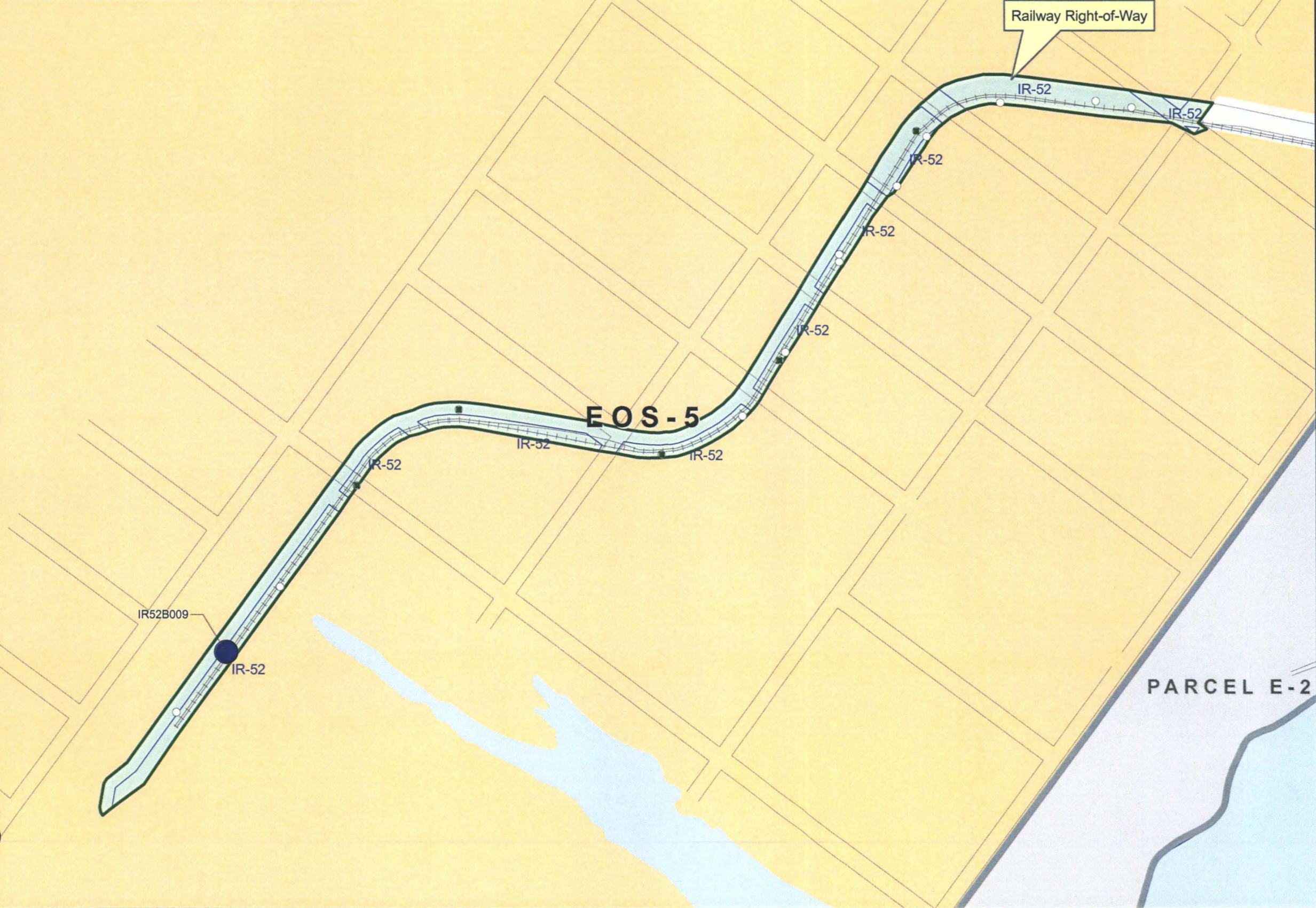
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U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 4.3.13-2

**METALS CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK EOS-5**

Revised Remedial Investigation Report for Parcel E

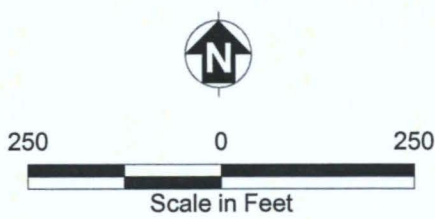
Results Exceeding Screening Criteria							
Point ID	Analyte	Result (mg/kg)	Screening Criteria (mg/kg)	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result/ Screening Criterion	
IR52B009	BENZO(A)ANTHRACENE	8.8	1.8	Industrial	3.75	3.75	4.9
IR52B009	BENZO(A)PYRENE	13.0	0.2	Industrial	3.75	3.75	72
IR52B009	BENZO(B)FLUORANTHENE	21.0	1.8	Industrial	3.75	3.75	11.7
IR52B009	BENZO(K)FLUORANTHENE	3.5	1.8	Industrial	3.75	3.75	1.9
IR52B009	DIBENZ(A,H)ANTHRACENE	1.7	0.3	Industrial	3.75	3.75	5.9
IR52B009	INDENO(1,2,3-CD)PYRENE	5.2	1.8	Industrial	3.75	3.75	2.9



Soil Results From 0 to 10 Feet bgs; Ratio of Result to Screening Criterion

- Nondetects Less than Screening Criteria
- Nondetects Exceeding Screening Criteria
- Detected Result Less than Screening Criteria
- Detected Result Exceeding Screening Criteria by More than 1 and Less than 5 Times
- Detected Result Exceeding Screening Criteria by More than 5 and Less than 10 Times
- Detected Result Exceeding Screening Criteria by More than 10 and Less than 20 Times
- Detected Result Exceeding Screening Criteria by More than 20 and Less than 50 Times
- Detected Result Exceeding Screening Criteria by More than 50 Times
- ▭ Redevelopment Block EOS-5 Boundary
- ▭ IR Site Boundary
- ▭ Other HPS Parcels
- ▭ Non-Navy Property
- ▬ Rail Line
- ▬ Road

Notes:
Planned reuse is open space
bgs Below ground surface
ft Feet
HPS Hunters Point Shipyard
IR Installation Restoration



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U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 4.3.13-3
SVOC
CONCENTRATIONS IN SOIL
(0 TO 10 FEET BGS)
REDEVELOPMENT BLOCK EOS-5
Revised Remedial Investigation Report for Parcel E

TABLES

TABLE 4-1: PARCEL E SOIL, GROUNDWATER, AND SEDIMENT SCREENING CRITERIA

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Chemical	Soil Criteria			Groundwater Criteria					Sediment Criteria ^a
	Residential Screening Criteria ¹ (mg/kg)	Industrial Screening Criteria ¹ (mg/kg)	HPAL ² (mg/kg)	Residential Vapor Intrusion Criteria ³ (µg/L)	Domestic Use Criteria ⁴ (µg/L)	MCL ⁵ (µg/L)	Surface Water Criteria ⁶ (µg/L)	HGAL ⁷ (µg/L)	Ambient (mg/kg) ^b
Metals									
Aluminum	73,000	1,700,000	NA	NA	36,000	1,000	NA	NA	NA
Antimony	10	820	9.05	NA	15	6	NA	43.26	NA
Arsenic	0.038	0.43	11.1	NA	0.007	10	36	27.34	15.3
Barium	7500	290,000	314.4	NA	7,300	1,000	NA	504.2	NA
Beryllium	140	2200	0.71	NA	NA	4	NA	1.4	NA
Cadmium	3.5	980	3.14	NA	18	5	8.8	5.08	0.33
Chromium	90,000	3,100,000	NA	NA	55,000	50	50	15.66	114
Chromium VI	17	37	NA	NA	NA	NA	50	NA	NA
Cobalt	900	1,900	NA	NA	730	NA	NA	20.8	NA
Copper	160	76,000	124.3	NA	1500	1300	3.1	28.04	68.1
Iron	22000	610,000	NA	NA	11,000	NA	NA	2,380	NA
Lead	160	800	8.99	NA	15	15	5.6	14.44	43.2
Manganese	840	32,000	1,431.20	NA	880	NA	NA	8140	NA
Mercury	1.6	610	2.28	NA	NA	2	0.025	0.6	0.43
Molybdenum	76	10,000	2.68	NA	180	NA	NA	61.9	NA
Nickel	300	21,000	NA	NA	730	100	8.2	96.48	112
Selenium	140	10,000	1.95	NA	180	50	71	14.5	0.65
Silver	50	10,000	1.43	NA	180	100	0.38	7.43	0.58
Thallium	5	130	0.81	NA	2.4	2	426	12.97	NA
Vanadium	65	2,000	117.2	NA	36	NA	NA	26.62	NA
Zinc	370	610,000	109.9	NA	11,000	NA	81	75.68	158
Volatile Organic Compounds									
1,1,1-Trichloroethane	2,000	7,000	NA	3,100	NA	200	6,240	NA	---
1,1,2,2-Tetrachloroethane	0.39	0.96	NA	NA	NA	1	1,804	NA	---
1,1,2-Trichloroethane	0.70	1.6	NA	4	NA	5	NA	NA	---
1,1-Dichloroethane	2.8	6	NA	6.5	NA	5	NA	NA	---
1,1-Dichloroethene	120	420	NA	190	NA	6	44,800	NA	---
1,2-Dichlorobenzene	1,100	4,200	NA	2,600	370	600	129	NA	---
1,2-Dichloroethane	0.28	0.61	NA	2.3	NA	0.5	22,600	NA	---
1,2-Dichloroethene (Total)	43	150	NA	210	NA	NA	44,800	NA	---
2-Butanone	22,000	120,000	NA	NA	NA	NA	NA	NA	---
2-Hexanone	22000	120,000	NA	NA	NA	NA	NA	NA	---

TABLE 4-1: PARCEL E SOIL, GROUNDWATER, AND SEDIMENT SCREENING CRITERIA (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Chemical	Soil Criteria			Groundwater Criteria					Sediment Criteria ^a
	Residential Screening Criteria ¹ (mg/kg)	Industrial Screening Criteria ¹ (mg/kg)	HPAL ² (mg/kg)	Residential Vapor Intrusion Criteria ³ (µg/L)	Domestic Use Criteria ⁴ (µg/L)	MCL ⁵ (µg/L)	Surface Water Criteria ⁶ (µg/L)	HGAL ⁷ (µg/L)	Ambient (mg/kg) ^b
Volatile Organic Compounds (Continued)									
4-Methyl-2-Pentanone	5300	66,000	NA	520,000	NA	NA	NA	NA	---
Acetone	14,000	56,000	NA	NA	NA	NA	NA	NA	---
Benzene	0.18	0.39	NA	0.37	NA	1	700	NA	---
Bromomethane	3.8	13	NA	19	NA	NA	6400	NA	---
Carbon Disulfide	360	1,200	NA	560	1,000	NA	NA	NA	---
Carbon Tetrachloride	0.091	0.2	NA	0.046	NA	0.5	6,400	NA	---
Chlorobenzene	150	540	NA	390	NA	70	129	NA	---
Chloroform	0.22	0.47	NA	0.7	NA	100	6,400	NA	---
Chloromethane	47	160	NA	92	NA	NA	6,400	NA	---
cis-1,2-Dichloroethene	43	150	NA	210	61	6	44,800	NA	---
Ethylbenzene	1,900	7,700	NA	3,100	1,300	700	86	NA	---
Methylene Chloride	4.3	9.9	NA	NA	NA	5	6,400	NA	---
para-Isopropyl Toluene	630	2,200	NA	NA	NA	NA	NA	NA	---
Styrene	4,400	19,000	NA	9,000	NA	100	NA	NA	---
Tetrachloroethene	0.48	1.5	NA	0.54	0.1	5	450	NA	---
Toluene	660	2,200	NA	1,400	720	150	5,000	NA	---
Trichloroethene	2.9	6.6	NA	2.9	1.4	5	400	NA	---
Vinyl Chloride	0.024	0.055	NA	0.028	0.032	0.5	NA	NA	---
m,p-Xylenes	270	900	NA	NA	NA	NA	NA	NA	---
o-Xylene	270	900	NA	340	NA	NA	NA	NA	---
Xylene (Total)	270	900	NA	340	210	1750	NA	NA	---
Semivolatile Organic Compounds⁸									
1-Methylnaphthalene	150	800	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	68	240	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	68	240	NA	66	7.2	70	129	NA	NA
1,2,4-Trimethylbenzene	52	170	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	21	70	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	530	2,200	NA	1,300	180	NA	129	NA	NA
1,4-Dichlorobenzene	2	4.5	NA	2.1	0.3	5	129	NA	NA
2,4-Dimethylphenol	29	18,000	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	3,900	27,000	NA	NA	NA	NA	1.5	NA	NA
2-Methylnaphthalene	150	800	NA	710	NA	NA	NA	NA	0.0194

TABLE 4-1: PARCEL E SOIL, GROUNDWATER, AND SEDIMENT SCREENING CRITERIA (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Chemical	Soil Criteria			Groundwater Criteria					Sediment Criteria ^a
	Residential Screening Criteria ¹ (mg/kg)	Industrial Screening Criteria ¹ (mg/kg)	HPAL ² (mg/kg)	Residential Vapor Intrusion Criteria ³ (µg/L)	Domestic Use Criteria ⁴ (µg/L)	MCL ⁵ (µg/L)	Surface Water Criteria ⁶ (µg/L)	HGAL ⁷ (µg/L)	Ambient (mg/kg) ^b
Semivolatile Organic Compounds⁸ (Continued)									
2-Nitroaniline	1.5	2,600	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	0.008	2.1	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-Methylphenol	9.2	4,400	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	3	4,400	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	0.29	440	NA	NA	NA	NA	970	NA	NA
Acenaphthene	3,700	38,000	NA	33,000	NA	NA	710	NA	0.0266
Acenaphthylene	3,700	38,000	NA	NA	NA	NA	60	NA	0.0317
Anthracene	22,000	390,000	NA	390,000	NA	NA	60	NA	0.088
Benzo(a)anthracene	0.37	1.8	NA	NA	NA	NA	60	NA	0.244
Benzo(a)pyrene	0.037	0.18	NA	NA	NA	0.2	60	NA	0.371
Benzo(b)fluoranthene	0.34	1.8	NA	NA	NA	NA	60	NA	NA
Benzo(e)pyrene	1700	23,000	NA	NA	NA	NA	NA	NA	0.412
Benzo(g,h,i)perylene	1600	23,000	NA	NA	NA	NA	60	NA	0.31
Benzo(k)fluoranthene	0.34	1.8	NA	NA	NA	NA	60	NA	0.258
Benzoic acid	2200	3,500,000	NA	NA	NA	NA	NA	NA	NA
Biphenyl	3000	30,000	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	1.1	180	NA	NA	NA	4	NA	NA	NA
Butylbenzylphthalate	11,000	180,000	NA	NA	NA	NA	588.8	NA	NA
Carbazole	2.2	120	NA	NA	NA	NA	NA	NA	NA
Chrysene	3.3	18	NA	NA	NA	NA	60	NA	0.289
Dibenz(a,h)anthracene	0.058	0.29	NA	NA	NA	NA	60	NA	0.327
Dibenzofuran	150	2500	NA	13,000	NA	NA	NA	NA	NA
Dibenzothiophene	150	2500	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	660	700,000	NA	NA	NA	NA	588.8	NA	NA
di-N-Butylphthalate	5500	88,000	NA	NA	NA	NA	588.8	NA	NA
di-N-Octylphthalate	2200	35,000	NA	NA	NA	NA	588.8	NA	NA
Fluoranthene	2,000	30,000	NA	NA	NA	NA	16	NA	0.514
Fluorene	2,700	39,000	NA	44,000	NA	NA	60	NA	0.0253
Indeno(1,2,3-cd)pyrene	0.35	1.8	NA	NA	NA	NA	60	NA	0.382
Isophorone	2.2	2,600	NA	NA	NA	NA	2,580	NA	NA
Isopropylbenzene	160	520	NA	7.8	NA	NA	NA	NA	NA
Naphthalene	1.7	4.7	NA	3.6	NA	NA	470	NA	0.0558

TABLE 4-1: PARCEL E SOIL, GROUNDWATER, AND SEDIMENT SCREENING CRITERIA (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Chemical	Soil Criteria			Groundwater Criteria					Sediment Criteria ^a
	Residential Screening Criteria ¹ (mg/kg)	Industrial Screening Criteria ¹ (mg/kg)	HPAL ² (mg/kg)	Residential Vapor Intrusion Criteria ³ (µg/L)	Domestic Use Criteria ⁴ (µg/L)	MCL ⁵ (µg/L)	Surface Water Criteria ⁶ (µg/L)	HGAL ⁷ (µg/L)	Ambient (mg/kg) ^b
Semivolatile Organic Compounds⁸ (Continued)									
Naphthalene, 1,6,7-Trimethyl-	150	800	NA	NA	NA	NA	NA	NA	NA
Naphthalene, 2,6-Dimethyl-	150	800	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	580	2,300	NA	NA	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	0.00017	0.35	NA	NA	NA	NA	660,000	NA	NA
n-Nitrosodiphenylamine	0.68	270	NA	NA	NA	NA	660,000	NA	NA
Pentachlorophenol	2.6	11	NA	NA	NA	1	7.9	NA	NA
Perylene	1,600	23,000	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	22,000	390,000	NA	190,000	NA	NA	60	NA	0.237
Phenanthrene, 1-Methyl-	22,000	390,000	NA	NA	NA	NA	NA	NA	NA
Phenol	69	260,000	NA	NA	NA	NA	1,160	NA	NA
Propylbenzene	580	2,300	NA	NA	NA	NA	NA	NA	NA
Pyrene	2,300	55,000	NA	230,000	NA	NA	60	NA	NA
sec-Butylbenzene	450	1,700	NA	NA	NA	NA	NA	NA	NA
tert-Butylbenzene	530	2,000	NA	NA	NA	NA	NA	NA	NA
Trichlorofluoromethane	390	1,300	NA	180	1,300	150	NA	NA	NA
Pesticides and Polychlorinated Biphenyl Congeners									
2,4'-DDD	2.1	17	NA	NA	NA	NA	NA	NA	NA
2,4'-DDE	1.6	12	NA	NA	NA	NA	NA	NA	NA
2,4'-DDT	1.2	12	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	2.1	17	NA	NA	NA	NA	0.72	NA	NA
4,4'-DDE	1.6	12	NA	NA	NA	NA	2.8	NA	NA
4,4'-DDT	1.2	12	NA	NA	NA	NA	0.001	NA	NA
Aldrin	0.024	0.15	NA	NA	NA	NA	0.26	NA	NA
alpha-BHC	0.0019	0.59	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	0.3	2.9	NA	NA	NA	NA	0.004	NA	NA
Aroclor-1016	3.5	29	NA	NA	NA	0.5	0.03	NA	0.0148
Aroclor-1242	0.18	1	NA	NA	NA	0.5	0.03	NA	0.0148
Aroclor-1248	0.2	1	NA	NA	NA	0.5	0.03	NA	0.0148
Aroclor-1254	0.093	1	NA	NA	NA	NA	0.03	NA	0.0148
Aroclor-1260	0.21	1	NA	NA	NA	0.5	0.03	NA	0.0148
beta-BHC	0.0066	2.1	NA	NA	NA	NA	NA	NA	NA
cis-Nonachlor	0.3	2.9	NA	NA	NA	NA	NA	NA	NA

TABLE 4-1: PARCEL E SOIL, GROUNDWATER, AND SEDIMENT SCREENING CRITERIA (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Chemical	Soil Criteria			Groundwater Criteria					Sediment Criteria ^a
	Residential Screening Criteria ¹ (mg/kg)	Industrial Screening Criteria ¹ (mg/kg)	HPAL ² (mg/kg)	Residential Vapor Intrusion Criteria ³ (µg/L)	Domestic Use Criteria ⁴ (µg/L)	MCL ⁵ (µg/L)	Surface Water Criteria ⁶ (µg/L)	HGAL ⁷ (µg/L)	Ambient (mg/kg) ^b
Pesticides and Polychlorinated Biphenyls Congeners (Continued)									
delta-BHC	11	270	NA	NA	NA	NA	NA	NA	NA
Dieldrin	0.00066	0.15	NA	NA	NA	NA	0.142	NA	0.00044
Endosulfan I	15	5,300	NA	NA	NA	NA	0.0087	NA	NA
Endosulfan II	15	5,300	NA	NA	NA	NA	0.0087	NA	NA
Endosulfan Sulfate	16	5,300	NA	NA	NA	NA	NA	NA	NA
Endrin	17	260	NA	NA	NA	2	0.0023	NA	NA
Endrin Aldehyde	17	260	NA	NA	NA	NA	NA	NA	NA
Endrin Ketone	17	260	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	0.0026	2.9	NA	NA	NA	0.2	0.032	NA	NA
gamma-Chlordane	0.3	2.9	NA	NA	NA	NA	0.004	NA	NA
Heptachlor	0.083	0.55	NA	NA	NA	0.01	0.0036	NA	NA
Heptachlor Epoxide	0.00054	0.27	NA	NA	NA	0.01	0.0036	NA	NA
Hexachlorobenzene	0.054	1.4	NA	NA	NA	1	129	NA	NA
Methoxychlor	290	4,400	NA	NA	NA	40	0.003	NA	NA
Oxychlordane	0.3	2.9	NA	NA	NA	NA	NA	NA	NA
PCB-018	0.2	1	NA	NA	NA	NA	NA	NA	NA
PCB-028	0.2	1	NA	NA	NA	NA	NA	NA	NA
PCB-044	0.2	1	NA	NA	NA	NA	NA	NA	NA
PCB-052	0.2	1	NA	NA	NA	NA	NA	NA	NA
PCB-066	0.2	1	NA	NA	NA	NA	NA	NA	NA
PCB-077	0.027	0.13	NA	NA	NA	NA	NA	NA	NA
PCB-101	0.2	1	NA	NA	NA	NA	NA	NA	NA
PCB-105	0.027	0.13	NA	NA	NA	NA	NA	NA	NA
PCB-114	0.0053	0.027	NA	NA	NA	NA	NA	NA	NA
PCB-118	0.027	0.13	NA	NA	NA	NA	NA	NA	NA
PCB-123	0.027	0.13	NA	NA	NA	NA	NA	NA	NA
PCB-128	0.2	1	NA	NA	NA	NA	NA	NA	NA
PCB-138	0.2	1	NA	NA	NA	NA	NA	NA	NA
PCB-153	0.2	1	NA	NA	NA	NA	NA	NA	NA
PCB-156	0.0053	0.027	NA	NA	NA	NA	NA	NA	NA
PCB-167	0.27	1.3	NA	NA	NA	NA	NA	NA	NA
PCB-170	0.2	1	NA	NA	NA	NA	NA	NA	NA

TABLE 4-1: PARCEL E SOIL, GROUNDWATER, AND SEDIMENT SCREENING CRITERIA (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Chemical	Soil Criteria			Groundwater Criteria					Sediment Criteria ^a
	Residential Screening Criteria ¹ (mg/kg)	Industrial Screening Criteria ¹ (mg/kg)	HPAL ² (mg/kg)	Residential Vapor Intrusion Criteria ³ (µg/L)	Domestic Use Criteria ⁴ (µg/L)	MCL ⁵ (µg/L)	Surface Water Criteria ⁶ (µg/L)	HGAL ⁷ (µg/L)	Ambient (mg/kg) ^b
Pesticides and Polychlorinated Biphenyls Congeners (Continued)									
PCB-180	0.2	1	NA	NA	NA	NA	NA	NA	NA
PCB-187	0.2	1	NA	NA	NA	NA	NA	NA	NA
PCB-189	0.027	0.13	NA	NA	NA	NA	NA	NA	NA
PCB-195	0.2	1	NA	NA	NA	NA	NA	NA	NA
PCB-206	0.2	1	NA	NA	NA	NA	NA	NA	NA
PCB-209	0.2	1	NA	NA	NA	NA	NA	NA	NA
trans-Nonachlor	0.3	2.9	NA	NA	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons									
TTPH ^{9,10,11}	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dioxins									
1,2,3,4,6,7,8,9-OCDD	0.036	0.27	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8,9-OCDF	0.036	0.27	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HPCDD	0.00036	0.0027	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,6,7,8-HPCDF	0.00036	0.0027	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8,9-HPCDF	0.00036	0.0027	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-HXCDD	0.000036	0.00027	NA	NA	NA	NA	NA	NA	NA
1,2,3,4,7,8-HXCDF	0.000036	0.00027	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-HXCDD	0.000036	0.00027	NA	NA	NA	NA	NA	NA	NA
1,2,3,6,7,8-HXCDF	0.000036	0.00027	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-HXCDD	0.000036	0.00027	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8,9-HXCDF	0.000036	0.00027	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-PECDD	0.0000036	0.000027	NA	NA	NA	NA	NA	NA	NA
1,2,3,7,8-PECDF	0.000072	0.00055	NA	NA	NA	NA	NA	NA	NA
2,3,4,6,7,8-HXCDF	0.000036	0.00027	NA	NA	NA	NA	NA	NA	NA
2,3,4,7,8-PECDF	0.0000072	0.000055	NA	NA	NA	NA	NA	NA	NA
2,3,7,8-TCDD	0.0000036	0.000027	NA	NA	NA	0.00003	NA	NA	NA
2,3,7,8-TCDF	0.000036	0.00027	NA	NA	NA	NA	NA	NA	NA
Organotins									
Dibutyltin	14	260	NA	NA	NA	NA	NA	NA	NA
Monobutyltin	14	260	NA	NA	NA	NA	NA	NA	NA
Tributyltin	14	260	NA	NA	NA	NA	NA	NA	NA

TABLE 4-1: PARCEL E SOIL, GROUNDWATER, AND SEDIMENT SCREENING CRITERIA (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Chemical	Soil Criteria			Groundwater Criteria					Sediment Criteria ^a
	Residential Screening Criteria ¹ (mg/kg)	Industrial Screening Criteria ¹ (mg/kg)	HPAL ² (mg/kg)	Residential Vapor Intrusion Criteria ³ (µg/L)	Domestic Use Criteria ⁴ (µg/L)	MCL ⁵ (µg/L)	Surface Water Criteria ⁶ (µg/L)	HGAL ⁷ (µg/L)	Ambient (mg/kg) ^b
Other Chemicals									
Cyanide	1,200	18,000	NA	NA	NA	200	1	NA	NA
MCPA	1	440	NA	NA	NA	NA	NA	NA	NA

Notes:

- 1 Residential and industrial screening criteria for soil are risk-based concentrations calculated based on the human health exposure pathways, exposure assumptions, and toxicity values identified in the HHRA (see Appendix I).
- 2 HPALs were derived by calculating the 95 percent UCL on the 95th percentile of a data set that included metals results for soil samples collected at Parcels B, C, D, and E in uncontaminated areas. HPALs are site-specific ambient concentrations for metals, representing a concentration that about 5 percent of all ambient results would exceed (PRC 1995).
- 3 Applies to data from A-aquifer (exposure to groundwater from inhalation of VOCs migrating through the subsurface to indoor air [vapor intrusion]) (see Appendix I)
- 4 Applies to data from B-aquifer (exposure to groundwater through domestic use, including ingestion and dermal contact)
- 5 Applies to data from B-aquifer: MCLs are drinking water standards published by EPA (2003) and by the California State Department of Health Services in Title 22 of the *California Code of Regulations* Sections 64431-64444.
- 6 The surface water screening criteria selection rationale is presented in Table 4-2.
- 7 HGALs were derived by calculating the 95 percent UCL on the 95th percentile value for each metal data set based on analytical results for groundwater samples collected at Parcels B, C, D, and E. HGALs are site-specific ambient concentrations for metals, representing a concentration that about 5 percent of all ambient results would exceed (PRC 1996).
- 8 PQLs (0.33 mg/kg) for several PAHs in soil and groundwater are greater than residential soil screening criteria and appropriate groundwater criteria. The screening criterion for these PAHs is the greater of the appropriate screening criterion or the PQL. PQL are considered the lowest concentrations that can be accurately measured and are used as screening criteria when greater than the risk-based criteria. Qualified data below the PQL are reported and mapped as detected concentrations.
- 9 TTPH soil criterion include: Soil Source Criteria, applicable to all reuse zones at Parcel E, TTPH concentration of 3,500 mg/kg in soil at depths ranging from 0 to 10 feet bgs; and the presence of measurable free product (greater than 0.01 feet) in groundwater or soil (either as LNAPLs or DNAPLs). (Shaw Environmental, Inc. 2007).
- 10 TTPH groundwater criteria in µg/L are based on distance from the shoreline in feet and range from 1,400 µg/L (from 0 to 50 feet) to 20,000 µg/L (for greater than 250 feet) (Shaw Environmental, Inc. 2007).
- 11 TTPH is the sum of the concentrations of TPH as gasoline, TPH as diesel, and TPH as motor oil; or is the sum of TPH as unknown purgeables and TPH as unknown extractables, whichever is greater
- a The primary objective of the screening criteria developed for shoreline sediments was to delineate the release of copper, lead, and PCBs resulting from site activities that could be a source of contamination to sediments in adjacent Parcel F (offshore). Only selected sediment screening criteria are listed in the table.
See Appendix G for details regarding the sediment screening process.
- b Ambient concentration based on an 85th percentile of 100 percent fines.
- c Values based on Long and Morgan (1991)
- d Values based on Long and others (1995)
- e Screening value from EPA (1996)

TABLE 4-1: PARCEL E SOIL, GROUNDWATER, AND SEDIMENT SCREENING CRITERIA (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Notes (Continued):

—	Samples were not analyzed for VOCs	MCL	Maximum contaminant level
µg/L	Micrograms per liter	MCPA	2-methyl-4-chlorophenoxy-acetic acid
bgs	Below ground surface	mg/kg	Milligram per kilogram
BHC	Benzene hexachloride	NA	Not applicable
DDD	Dichlorodiphenyldichloroethane	OCDD	Octachlorodibenzo-p-dioxin
DDE	Dichlorodiphenyldichloroethene	OCDF	Octachlorodibenzofuran
DDT	Dichlorodiphenyltrichloroethane	PAH	Polynuclear aromatic hydrocarbon
DNAPL	Dense nonaqueous-phase liquid	PCB	Polychlorinated biphenyl
EPA	U.S. Environmental Protection Agency	PECDD	Pentachlorodibenzo-p-dioxin
ER-L	Effects range-low	PECDF	Pentachlorodibenzofuran
ER-M	Effects range-median	PQL	Practical quantitation limit
HGAL	Hunters Point groundwater ambient level	TCDD	Tetrachlorodibenzo-p-dioxin
HPAL	Hunters Point ambient level (soil)	TCDF	Tetrachlorodibenzofuran
HPCDD	Heptachlorodibenzo-p-dioxin	TTPH	Total total petroleum hydrocarbons
HPCDF	Heptachlorodibenzofuran	UCL	Upper confidence limit
HXCDF	Hexachlorodibenzofuran	VOC	Volatile organic compound
LNAPL	Light nonaqueous-phase liquid		

Sources:

- EPA. 1996. "Recommendations for Screening Values for Tributyltin in Sediments at Superfund Sites in Puget Sound, Washington." EPA 910/R/96/014. October.
- EPA. 2003. "List of Drinking Water Contaminants & MCLs." Available online at: <http://www.epa.gov/safewater/mcl.html>
- Long, E.R., D.D. MacDonald, S.L. Smith, and F.D. Calder. 1995. "Incidence of Adverse Biological Effects with Ranges of Chemical Concentrations in Marine and Estuarine Sediments." *Environmental Management*. Volume 19, No. 1. Pages 81-97.
- Long, E.R., and L.G. Morgan. 1991. "The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status Administration and Trends Program." National Oceanic and Atmospheric Administration Technical Memorandum NOS OMA 52. Seattle, Washington.
- PRC. 1995. "Draft Calculation of Hunters Point Ambient Levels, Hunters Point Annex, San Francisco, California." August 17.
- PRC. 1996. "Technical Memorandum: Estimation of HPS Groundwater Ambient Levels, HPS, San Francisco, California." September 16.
- Shaw Environmental, Inc. 2007. "New Preliminary Screening Criteria and Petroleum Programs Strategy, Final, Hunters Point Shipyard, San Francisco, California." December 21.

TABLE 4-2: SURFACE WATER CRITERIA FOR THE SAN FRANCISCO BAY
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Monitored	Pseudonym	San Francisco Bay Basin Plan ^a (µg/L)	California Toxics Rule Criteria for Enclosed Bays and Estuaries ^e (µg/L)						National Recommended Water Quality Criteria ^k (µg/L)						National Ambient Water Quality Criteria (AWQC) for Protection of Saltwater Aquatic Life ^l (µg/L)						Other Criteria (footnotes indicate source) (µg/L)	Selected Water Quality Criteria (µg/L)
			Saltwater Aquatic Life						Lowest Observed Effect Level (LOEL)													
			Chronic ^g		Acute ^g		Instantaneous Maximum		Chronic ^g		Acute ^g		Chronic ^h		Acute ⁱ		Other ^j					
			Conc.	Footnotes	Conc.	Footnotes	Conc.	Footnotes	Conc.	Footnotes	Conc.	Footnotes	Conc.	Footnotes	Conc.	Footnotes	Conc.	Footnotes	Other	Footnotes		
1,1,1-Trichloroethane	1,1-Dichloroethylene	--	--	--	--	--	--	--	--	--	--	--	--	--	31,200	6,240	--	--	--	--	6,240	
1,1,2,2-Tetrachloroethane		--	--	--	--	--	--	--	--	--	--	--	--	--	9,020	1,804	--	--	--	--	1804	
1,1-Dichloroethene		--	--	--	--	--	--	--	--	--	--	--	--	--	224,000	44800	(27)	--	--	--	44,800	
1,2,4,5-Tetrachlorobenzene		--	--	--	--	--	--	--	--	--	--	--	--	--	250	50	(22)	50	(22.23)	--	50	
1,2,4-Trichlorobenzene		--	--	--	--	--	--	--	--	--	--	--	129	(22)	160	--	(22)	--	--	--	129	
1,2-Dichlorobenzene	1,2-Dichloroethene Propylene dichloride	--	--	--	--	--	--	--	--	--	--	--	129	(22)	1,970	--	(24)	--	--	--	129	
1,2-Dichloroethane		--	--	--	--	--	--	--	--	--	--	--	--	113,000	22,600	--	--	--	--	22,600		
1,2-Dichloroethene (total)		--	--	--	--	--	--	--	--	--	--	--	--	224,000	44,800	(27)	--	--	--	44,800		
1,2-Dichloropropane		--	--	--	--	--	--	--	--	--	--	--	3,040	(28)	10,300	--	(28)	--	--	--	3,040	
1,3-Dichlorobenzene		--	--	--	--	--	--	--	--	--	--	--	129	(22)	1,970	--	(24)	--	--	--	129	
1,3-Dichloropropene (total)		--	--	--	--	--	--	--	--	--	--	--	--	790	158	(29)	--	--	--	--	158	
1,4-Dichlorobenzene		--	--	--	--	--	--	--	--	--	--	129	(22)	1,970	--	(24)	--	--	--	--	129	
2,4-Dinitrophenol		--	--	--	--	--	--	--	--	--	--	--	--	230	46	(88)	150	(38.88)	--	--	46	
2,4-Dinitrotoluene		--	--	--	--	--	--	--	--	--	--	--	--	590	118	(53)	370	(53.82)	--	--	118	
2,6-Dinitrotoluene		--	--	--	--	--	--	--	--	--	--	--	--	590	118	(53)	370	(53.82)	--	--	118	
2-Chloronaphthalene	Nitrophenol 2,4-DDD; DDD 2,4-DDE 4,4'-DDT	--	--	--	--	--	--	--	--	--	--	--	--	7.5	1.5	(48)	--	--	--	--	1.5	
2-Nitrophenol		--	--	--	--	--	--	--	--	--	--	--	--	4,850	970	(88)	--	--	--	--	970	
4,4'-DDD		--	--	--	--	--	--	--	--	--	--	--	--	3.6	0.72	--	--	--	--	--	.72	
4,4'-DDE		--	--	--	--	--	--	--	--	--	--	--	--	14	2.8	--	--	--	--	--	2.8	
4,4'-DDT		0.001	(114)	0.13	--	--	--	0.001	G,aa,ii	0.13	--	G,ii	--	--	--	--	--	--	--	--	.001	
4,6-Dinitro-2-methylphenol	4,6-Dinitro-o-cresol Dinitrotoluenes; 4-Methyl-3,5-dinitroaniline	--	--	--	--	--	--	--	--	--	--	--	--	4,850	970	(88)	--	--	--	--	970	
4-Amino-2,6-dinitrotoluene		--	--	--	--	--	--	--	--	--	--	--	--	590	118	--	370	(82)	--	--	118	
4-Nitrophenol		--	--	--	--	--	--	--	--	--	--	--	--	4,850	970	(88)	--	--	--	--	970	
Acenaphthene		--	--	--	--	--	--	--	--	--	--	710	--	970	--	--	500	(38)	--	--	710	
Acenaphthylene		--	--	--	--	--	--	--	--	--	--	--	--	300	60	(52)	--	--	--	--	60	
Aldrin	Chlordane	--	--	--	--	--	1.3	--	II	--	--	1.3	0.26	G	--	--	--	--	--	--	.26	
Alpha-chlordane		--	--	0.004	(114)	--	0.09	--	--	0.004	G,aa,o	0.09	--	G,o	--	--	--	--	--	--	.004	
Anthracene		--	--	--	--	--	--	--	--	--	--	--	--	300	60	(52)	--	--	--	--	60	
Aroclor 1016		--	--	0.03	rr	--	--	--	0.03	N,aa	--	--	--	--	10	--	--	--	--	--	--	.03
Aroclor 1221		--	--	0.03	rr	--	--	--	0.03	N,aa	--	--	--	--	10	--	--	--	--	--	--	.03
Aroclor 1232	Polychlorinated biphenyls (PCBs)	--	--	0.03	rr	--	--	--	0.03	N,aa	--	--	--	--	10	--	--	--	--	--	--	.03
Aroclor 1242		--	--	0.03	rr	--	--	--	0.03	N,aa	--	--	--	--	10	--	--	--	--	--	--	.03
Aroclor 1248		--	--	0.03	rr	--	--	--	0.03	N,aa	--	--	--	--	10	--	--	--	--	--	--	.03
Aroclor 1254		--	--	0.03	rr	--	--	--	0.03	N,aa	--	--	--	--	10	--	--	--	--	--	--	.03
Aroclor 1260		--	--	0.03	rr	--	--	--	0.03	N,aa	--	--	--	--	10	--	--	--	--	--	--	.03
Arsenic		36	b	36	mm, oo	69	--	mm, oo	36	A,D,bb	69	--	A,D,bb	--	2,319	--	(95)	13	(6)	--	36	
Atrazine		--	--	--	--	--	--	--	11	r,(68)	310	--	r,(68)	--	--	--	--	--	--	--	11	
Benzene		--	--	--	--	--	--	--	--	--	--	--	--	5,100	--	--	700	--	--	--	700	
Benzo(a)anthracene		--	--	--	--	--	--	--	--	--	--	--	--	300	60	(52)	--	--	--	--	60	
Benzo(a)pyrene		--	--	--	--	--	--	--	--	--	--	--	--	300	60	(52)	--	--	--	--	60	
Benzo(b)fluoranthene		--	--	--	--	--	--	--	--	--	--	--	--	300	60	(52)	--	--	--	--	60	
Benzo(g,h,i)perylene		--	--	--	--	--	--	--	--	--	--	--	--	300	60	(52)	--	--	--	--	60	
Benzo(k)fluoranthene		--	--	--	--	--	--	--	--	--	--	--	--	300	60	(52)	--	--	--	--	60	
Bromochloromethane		n-Butyl benzyl phthalate	--	--	--	--	--	--	--	--	--	--	6,400	(20)	12,000	--	(20)	11,500	(20, 83)	--	--	6,400
Bromodichloromethane	--		--	--	--	--	--	--	--	--	--	6,400	(20)	12,000	--	(20)	11,500	(20, 83)	--	--	6,400	
Bromoform	--		--	--	--	--	--	--	--	--	--	6,400	(20)	12,000	--	(20)	11,500	(20, 83)	--	--	6,400	
Bromomethane	--		--	--	--	--	--	--	--	--	--	6,400	(20)	12,000	--	(20)	11,500	(20, 83)	--	--	6,400	
Butylbenzylphthalate	--		--	--	--	--	--	--	--	--	--	--	--	2,944	588.8	(45)	3.4	(38, 45)	--	--	588.8	
Cadmium	Monochlorobenzene	9.3	b	9.3	(1, 142)	42	--	(1, 142)	8.8	D,bb,gg	40	--	D,bb,gg	--	--	--	--	--	--	--	8.8	
Carbon tetrachloride		--	--	--	--	--	--	--	--	--	--	6,400	(20)	50,000	--	--	11,500	(20, 82)	--	--	6,400	
Chlordane		--	--	0.004	(114)	--	--	--	0.09	0.009	--	0.004	G,aa	0.09	0.009	G	--	--	--	--	.004	
Chlorobenzene		--	--	--	--	--	--	--	--	--	--	129	(22)	160	--	(22)	--	--	--	--	129	
Chloroform		--	--	--	--	--	--	--	--	--	--	6,400	(20)	12,000	--	(20)	11,500	(20, 82)	--	--	6,400	
Chloromethane		--	--	--	--	--	--	--	--	--	--	6,400	(20)	12,000	--	(20)	11,500	(20, 82)	--	--	6,400	
Chromium (total)		50 (VI)	b,o	50 (VI)	o	1100 (VI)	--	--	--	50 (VI)	D,bb,o	1100 (VI)	--	D,bb,o	--	--	--	--	--	--	50	
Chrysene		--	--	--	--	--	--	--	--	--	--	--	--	300	60	(52)	--	--	--	--	60	
Cis-1,2-dichloroethene		Cis-1,2-dichloroethylene	--	--	--	--	--	--	--	--	--	--	--	224,000	44,800	(27)	--	--	--	--	--	44,800
Copper	4.9		c	3.1	nn, oo	4.8	--	oo	3.1	D,cc,ff	4.8	--	D,cc,ff	--	--	--	--	--	--	--	3.1	
Cyanide	5		c	1	pp	1	--	pp	1	Q,bb	1	--	Q,bb	--	--	--	--	--	--	--	1	
Dibenz(a,h)anthracene	1,2:5,6-Dibenzanthracene	--	--	--	--	--	--	--	--	--	--	--	--	300	60	(52)	--	--	--	--	60	
Dibromochloromethane		--	--	--	--	--	--	--	--	--	--	6,400	(20)	12,000	--	(20)	11,500	(20, 83)	--	--	6,400	
Dieldrin		--	--	0.0019	(114), II	--	--	--	0.71	--	II	0.0019	G,aa	0.71	.142	G	--	--	--	--	.142	
Diethylphthalate		--	--	--	--	--	--	--	--	--	--	--	--	2,944	588.8	(45)	3.4	(38, 45)	--	--	588.8	

TABLE 4-2: SURFACE WATER CRITERIA FOR THE SAN FRANCISCO BAY (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Monitored	Pseudonym	San Francisco Bay Basin Plan ^a (µg/L)		California Toxics Rule Criteria for Enclosed Bays and Estuaries ^e (µg/L)						National Recommended Water Quality Criteria ^k (µg/L)						National Ambient Water Quality Criteria (AWQC) for Protection of Saltwater Aquatic Life ^l (µg/L)						Other Criteria (footnotes indicate source) (µg/L)		Selected Water Quality Criteria (µg/L)
										Saltwater Aquatic Life						Lowest Observed Effect Level (LOEL)								
				Chronic ^g		Acute ^g		Instantaneous Maximum		Chronic ^g		Acute ^g		Chronic ^h		Acute ⁱ		Other ^j						
				Conc.	Footnotes	Conc.	Footnotes	Conc.	Footnotes	Conc.	Footnotes	Conc.	Footnotes	Conc.	Footnotes	Conc.	Footnotes	Conc.	Footnotes	Other	Footnotes			
Dimethylphthalate		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2,944	--	(45)	3.4	(38, 45)	--	--	3.4
Di-n-butylphthalate	Dibutyl phthalate	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2,944	588.8	(45)	3.4	(38, 45)	--	--	588.8
Di-n-octylphthalate	Bis-n-octyl phthalate	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2,944	588.8	(45)	3.4	(38, 45)	--	--	588.8
Endosulfan I	Endosulfan (alpha)	--	--	0.0087	II	--	--	--	0.034	--	(115), II	0.0087	G,Y,o	0.034	--	G,Y,o	--	--	--	--	--	--	--	0.0087
Endosulfan II	Endosulfan (beta)	--	--	0.0087	II	--	--	--	0.034	--	(115), II	0.0087	G,Y,o	0.034	--	G,Y,o	--	--	--	--	--	--	--	0.0087
Endrin		--	--	0.0023	(114), II	--	--	--	0.037	--	II	0.0023	G,aa	0.037	--	G	--	--	--	--	--	--	--	0.0023
Ethylbenzene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	430	86	--	--	--	--	--	86
Fluoranthene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	16	40	--	--	--	--	--	16
Fluorene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	300	60	(52)	--	--	--	60
Gamma-BHC (lindane)	Gamma-Benzene hexachloride	--	--	--	--	--	--	--	0.16	--	II	--	--	0.16	0.032	G	--	--	--	--	--	--	--	.032
Gamma-chlordane	Chlordane	--	--	0.004	(114)	--	--	--	0.09	--	--	0.004	G,aa,o	0.09	--	G,o	--	--	--	--	--	--	--	.004
Heptachlor		--	--	0.0036	(114)	II	--	--	0.053	--	II	0.0036	G,aa	0.053	--	G	--	--	--	--	--	--	--	.0036
Heptachlor epoxide		--	--	0.0036	(114)	II	--	--	0.053	--	II	0.0036	G,V,aa	0.053	--	G,V	--	--	--	--	--	--	--	.0036
Hexachlorobenzene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	129	(22)	160	--	(22)	--	--	129
Hexachlorobutadiene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	32	6.4	--	--	--	--	6.4
Hexachlorocyclopentadiene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7.0	1.4	--	--	--	--	1.4
Hexachloroethane		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	940	188	--	--	--	--	188
Indeno(1,2,3-cd)pyrene	Ideno(1,2,3-cd)pyrene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	300	60	(52)	--	--	--	60
Isophorone		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12,900	2,580	--	--	--	--	2,580
Lead		5.6	b	8.1	(1, 142), m	210	--	(1, 142), m	--	--	--	8.1	D,bb	210	--	D,bb	--	--	--	--	--	--	--	5.6
Mercury	Mercury, inorganic	0.025	b	--	--	--	--	--	--	--	--	0.94	D,ee,hh	1.8	--	D,ee,hh	--	--	--	--	--	--	--	0.025
Methoxychlor		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.003	(51),f	0.003
Methyl-tert-butyl-ether	Methyl t-butyl ether (MTBE), Methyl tertiary	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8,000	p	8,000
Methylene chloride	Dichloromethane	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6,400
Mirex		--	--	--	--	--	--	--	--	--	--	0.001	F	--	--	--	6,400	(20)	12,000	--	(20)	11,500	(20, 82)	0.001
Naphthalene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2,350	470	--	--	--	--	470
Nickel		8.3	b	8.2	(2, 142), oo	74	--	(1, 142), oo	--	--	--	8.2	D,bb	74	--	D,bb	--	--	--	--	--	--	--	8.2
Nitrobenzene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6,680	1,336	--	--	--	--	1,336
N-Nitroso-di-n-propylamine	N-Nitroso-di-n-propylamine; N-Nitrosodi	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3,300,000	660,000	(56)	--	--	--	660,000
N-nitrosodiphenylamine		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3,300,000	660,000	(56)	--	--	--	660,000
Pentachlorophenol		--	--	7.9	--	13	--	--	--	--	--	7.9	bb	13	--	bb	--	--	--	--	--	--	--	7.9
Phenanthrene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	300	60	(52)	--	--	--	60
Phenol		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5,800	1,160	--	--	--	--	1,160
Pyrene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	300	60	(52)	--	--	--	60
Selenium		--	--	71	(1, 142)	290	--	(1, 142)	--	--	--	71	D,bb,dd	290	--	D,bb,dd	--	--	--	--	--	--	--	71
Silver		2.3	d	--	--	1.9	0.38	(1, 142)	--	--	--	--	--	1.9	0.38	D,G	--	--	--	--	--	--	--	0.38
Sulfide	Sulfide-Hydrogen Sulfide	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.2	(51),f	0.2
Tetrachloroethene	Tetrachloroethylene (PCE)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	450	--	10,200	--	--	--	--	450
Thallium		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2,130	426	--	--	--	--	426
Toluene		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5,000	--	6,300	--	--	--	--	5,000
Toxaphene		--	--	0.0002	--	0.21	--	--	--	--	--	0.0002	aa	0.21	--	--	--	--	--	--	--	--	--	0.0002
TPH-Diesel	Diesel range organics; Diesel Fuel; Diesel	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,400	q	1,400
TPH-Gasoline	Gasoline range organics; Gasoline	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,400	q	1,400
TPH-Motor Oil	Motor oil; motor oil range organics	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,400	q	1,400
trans-1,2-Dichloroethene	trans-1,2-Dichloroethylene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	224,000	44,800	(27)	--	--	--	44,800
Trichloroethene	Trichloroethylene (TCE)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2,000	400	--	--	--	--	400
Zinc		58	c	81	mm, oo	90	--	oo	--	--	--	81	D,bb	90	--	D,bb	--	--	--	--	--	--	--	81

TABLE 4-2: SURFACE WATER CRITERIA FOR THE SAN FRANCISCO BAY (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Notes: Values shaded are those selected as screening criteria. Footnotes and references are detailed below.	
–	No criterion available
ug/L	Microgram per liter
BHC	Benzene Hexachloride (Lindane)
DDD	Dichlorodiphenyldichloroethane
DDE	1,1-dichloro-2,2-bis(p-chlorophenyl)ethylene
DDT	1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane
TPH	Total petroleum hydrocarbons
Footnotes:	
a	California Environmental Protection Agency, Regional Water Quality Control Board, San Francisco Bay Area Region (Water Board). 1995. "San Francisco Bay Basin Plan Water Quality Control Plan." June 21. Table 3-3 Water Quality Objectives for Toxic Pollutants for Surface Water With Salinities Greater Than 5 Parts Per Billion.
b	From Water Board "Basin Plan" 4-Day Average (Chronic)
c	From Water Board "Basin Plan" 24-Hour and 1-Hour Average (Acute)
d	From Water Board "Basin Plan" Instantaneous Maximum
e	From "Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California" (CTR) (EPA 2000) and "Water Quality Control Plan, San Francisco Bay Basin Region" (Water Board 1995). The most appropriate criteria were used.
f	Criterion made more suitably protective by means of standard convention of lowering acute values by 80 percent and instantaneous values by 90 percent to make them more appropriate for use under chronic exposure scenarios.
g	An acute criterion (EPA identified as Criteria Maximum Concentration [CMC]) is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed briefly without resulting in an unacceptable effect. The chronic concentration (EPA identified as Criterion Continuous Concentration [CCC]) is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect. The CMC and CCC are just two of the six parts of an aquatic life criterion; the other four parts are the acute averaging period, chronic averaging period, acute frequency of allowed exceedance, and chronic frequency of allowed exceedance. Because 304(a) aquatic life criteria are national guidance, they are intended to be protective of the vast majority of the aquatic communities in the United States (EPA 2002a).
h	EPA National "AWQC Lowest Observed Effect Level (Chronic)" (Water Board 2000)
i	EPA National "AWQC Lowest Observed Effect Level (Acute)" (Water Board 2000)
j	EPA National "AWQC Lowest Observed Effect Level (Other)" (Water Board 2000)
k	From "National Recommended Water Quality Criteria: 2002" (EPA 2002a) and "Revision of National Recommended Water Quality Criteria." (EPA 2002b), unless otherwise noted.
l	From "Final Technical Memorandum Estimation of Ambient Concentrations of Metals in Groundwater" (Tetra Tech 2001)
m	In instances where criteria from "Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California" (EPA 2000) refer to the "Water Quality Control Plan, San Francisco Bay Basin Region" (Water Board 1995), Water Board 1995 criteria were used. The Water Board 1995 criteria are distinguished by an "m" in the footnote column.
o	Detailed application of this toxicity criterion may require the review and/or summation of analyte isomer, congener, or speciation results, as applicable. Please see applicable regulatory agency source document for additional detail.
p	Water Board 1998
q	Tetra Tech EM Inc. 1999
r	Water Board 2000
The following lettered footnotes are derived from EPA "National Recommended Water Quality Criteria: 2002" (EPA 2002a), Table 1 - Priority Toxic Pollutants:	
A	This recommended water quality criterion was derived from data for arsenic (III), but is applied here to total arsenic, which might imply that arsenic (III) and arsenic (V) are equally toxic to aquatic life and that their toxicities are additive. In the arsenic criteria document (EAP 440/5-84-033, January 1985), Species Mean Acute Values (SMAVs) are given for both arsenic (III) and arsenic (V) for five species, and the ratios of the SMAVs for each species range from 0.6 to 1.7. Chronic values are available for both arsenic (III) and arsenic (V) for one species; for the fathead minnow, the chronic value for arsenic (V) is 0.29 times the chronic value for arsenic (III). No data are known to be available concerning whether the toxicities of the forms of arsenic to aquatic organisms are additive
D	Freshwater and saltwater criteria for metals are expressed in terms of the dissolved metal in the water column. The recommended water quality criteria value was calculated by using the previous 304(a) aquatic life criteria expressed in terms of total recoverable metal, and multiplying it by a conversion factor (CF). The term "Conversion Factor" (CF) represents the recommended conversion factor for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column. (Conversion Factors for saltwater CCCs are currently unavailable. Conversion factors derived for saltwater CMCs have been used for both saltwater CMCs and CCCs). See "Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria," October 1, 1993, by Martha G. Prothro, Acting Assistant Administrator for Water, available from the Water Resource center, USEPA, 401 M St., SW, mail code RC4100, Washington DC 20460; and 40CFR 131.36(b)(1). Conversion Factors applied in the table can be found in Appendix A to the Preamble - Conversion Factors for Dissolved Metals.
F	The deviation of this value is presented in the Red Book (EPA 440/9-76-023, July 1976).
G	The criterion is based on 304(a) aquatic life criterion issued in 1980 and was issued in one of the following documents: Aldrin/Dieldrin (EPA 440/5-80-019), Chlordane (EPA 440/5-80-027), Dichlorodiphenyltrichloroethane (DDT) (EPA 440/5-80-38), Endosulfan (EPA 440/5-80-046), Endrin (EPA 440/5-80-047), Heptachlor (EPA 440/5-80-052), Hexachlorocyclohexane (EPA 440/5-80-054), Silver (EPA 440/5-80-071). The minimum data requirements and derivation procedures were different in the 1980 Guidelines than in the 1985 Guidelines. For example, a "CMC" derived using the 1980 Guidelines was derived to be used as an instantaneous maximum. If assessment is to be done using an averaging period, the values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.
N	This criterion applies to total polychlorinated biphenyls (e.g. the sum of all congener or all isomer or homolog or Aroclor analyses.)
Q	This recommended water quality criterion is expressed as mg free cyanide (as CN)/L.
V	This value was derived from data for heptachlor, and the criteria document provides insufficient data to estimate the relative toxicities of heptachlor and heptachlor epoxide.
Y	This value was derived from data for endosulfan and is most appropriately applied to the sum of alpha-endosulfan and beta-endosulfan.
aa	This criterion is based on a 304(a) aquatic life criterion issued in 1980 or 1986, and was issued in one of the following documents: Aldrin/Dieldrin (EPA 440/5-80-019), Chlordane (EPA 440/5-80-027), DDT (EPA 440/5-80-038), Endrin (EPA 4405-80-047), Heptachlor (EPA 440/5-80-052), Polychlorinated biphenyls (EPA 440/5-80-068), Toxaphene (EPA 440/5-86-006). This CCC is currently based on the Final Residue Value (FRV) procedure. Since the publication of the Great Lakes Aquatic Life Criteria Guidelines in 1995 (60 FR 15393-15399, March 23, 1995), the EPA no longer uses the Final Residue Value procedure for deriving CCCs for new or revised 304(a) aquatic life criteria. Therefore, the EPA anticipates that future revisions of this CCC will not be based on FRV procedure.
bb	This water quality criterion is based on a 304(a) aquatic life criterion that was derived using the 1985 Guidelines <i>Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses</i> , PB85-227046, January 1985) and was issued in one of the following criteria documents: Arsenic (EPA 440/5-84-033), Cadmium (EPA 882-R-01-001), Chromium (EPA 440/5-84-029), Copper (EPA 440/5-84-031), Cyanide (EPA 440/5-84-028), Lead (EPA 440/5-84-027), Nickel (EPA 440/5-86-004), Pentachlorophenol (EPA 440/5-86-009), Toxaphene (EPA 440/5-86-006), Zinc (EPA 440/5-87-003).
cc	When the concentration of dissolved organic carbon is elevated, copper is substantially less toxic, and use of Water-Effect Ratios might be appropriate.
dd	The selenium criteria document (EPA 440/5-87-006, September 1987) provides that if selenium is as toxic to saltwater fishes in the field as it is to freshwater fish in the field, the status of the fish community should be monitored whenever the concentration of selenium exceeds 5.0 mg/L in salt water because the saltwater CCC does not take into account uptake via the food chain.
ee	This recommended water quality criterion was derived on page 43 of the mercury document (EPA 440/5-84-026, January 1985). The saltwater CCC of 0.025µg/L given on page 23 of the criteria document is based on the Final Residue Value procedure in the 1985 Guidelines. Since the publication of the Great Lakes Aquatic Life Criteria Guidelines in 1995 (60 FR 15393-15399, March 23, 1995), the Agency no longer uses the Final Residue Value procedure for deriving CCCs for new or revised 304(a) aquatic life criteria.
ff	This recommended water quality criterion was derived in Ambient Water Quality Criteria Saltwater Copper Addendum (draft, April 14, 1995) and was promulgated in the Interim final National Toxics Rule (60 FR 22228-22237, May 4, 1995).
gg	EPA is actively working on this criterion, and so this recommended water quality criterion may change substantially in the near future.
hh	This recommended water quality criterion was derived from data for inorganic mercury (II), but is applied here to total mercury. If a substantial portion of the mercury in the water column is methylmercury, this criterion will probably be under protective. In addition, even though inorganic mercury is converted to methylmercury, and methylmercury bioaccumulates to a great extent, this criterion does not account for uptake via the food chain because sufficient data were not available when the criterion was derived
ii	This criterion applies to DDT and its metabolites (that is, the total concentration of DDT and its metabolites should not exceed this value.)

TABLE 4-2: SURFACE WATER CRITERIA FOR THE SAN FRANCISCO BAY (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

The following lettered footnotes are derived from EPA "Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California" (EPA 2000)

- ll This criterion is based on 304(a) aquatic life criterion issued in 1980, and was issued in one of the following documents: Aldrin/ Dieldrin (EPA 440/5-80-019), Chlordane (EPA 440/5-80-027), DDT (EPA 440/5-80-038), Endosulfan (EPA 440/5-80-046), Endrin (EPA 440/5-80-047), Heptochlor (440/5-80-025), Hexachlorocyclohexane (EPA 440/5/80/054), Silver (EPA 440/5-80-071) (originally footnote g in CTR).
- mm Criteria for these metals are expressed as a function of the water-effect ratio (WER) (originally footnote l in the CTR)
- nn No criterion for protection of human health from consumption of aquatic organisms (excluding water) was presented in the 1980 criteria document or in the 1986 Quality Criteria for Water. Nevertheless, sufficient information was presented in the 1980 document to allow a calculation of a criterion, even though the results of such calculations were not shown in the document.
- oo These freshwater and saltwater criteria for metals are expressed in terms of dissolved fraction of the metal in the water column. Criterion values were calculated by using EPA's Clean Water Act 304(a) guidance values (described in the total recoverable fraction) and then applying the conversion factors in 131.36(b)(1) and (2).
- pp These criteria were promulgated for specific waters in California in the National Toxics Rule (NTR). The specific waters to which the NTR criteria apply include Waters of the State defined as bays or estuaries, including the San Francisco Bay upstream to and including Suisun Bay and the Sacramento-San Joaquin Delta. This section does not apply instead of the NTR for these criteria.
- rr PCBs are a class of chemicals that include Aroclors 1242,1254,1221,1232,1248,1260, and 1016. The aquatic life criteria apply to the sum of this set of seven Aroclors.

The following numbered footnotes are derived from "A Compilation of Water Quality Goals" (Water Board 2000). These footnotes directly correlate with the source document.

- 1 Expressed as dissolved
- 2 Expressed as total recoverable
- 6 Pentavalent arsenic [As(V)] effects on plants.
- 20 For halomethanes
- 22 For chlorinated benzenes
- 23 Toxicity to a fish species exposed for 7.5 days
- 24 For dichlorobenzenes
- 27 For dichloroethylenes
- 28 For dichloropropanes
- 29 For dichloropropenes
- 38 Toxicity to algae occurs
- 45 For phthalate esters
- 48 For chlorinated naphthalenes
- 51 From U.S. Environmental Protection Agency, *Quality Criteria for Water* (1976) "The Red Book."
- 52 For polycyclic aromatic hydrocarbons
- 53 For dinitrotoluenes
- 56 For nitrosamines
- 68 Draft/tentative/provisional; applies only to second value if more than one value is listed.
- 82 A decrease in the number of algal cells occurs.
- 83 Adverse effects on a fish species exposed for 168 days.
- 88 For nitrophenols
- 95 For the pentavalent form
- 114 Developed as 24-hour average using 1980 EPA guidelines, but applied as 4-day average in the National Toxics Rule and/or Proposed California Toxics Rule.
- 115 Criterion most appropriately applied to the sum of alpha-endosulfan and beta-endosulfan.
- 116 Applies separately to Aroclors 1242, 1254, 1221, 1232, 1248, 1260, and 1016; based on carcinogenicity at 1-in-a-million risk level.
- 142 Criteria do not apply to waters subject to water quality objectives in Tables III-2A and III-2B of the San Francisco Bay Regional Water Quality Control Board's 1986 Basin Plan
- 143 These criteria were promulgated for specific California waters in the National Toxics Rule
- 144 The ambient level was set at or below the minimum reported detection limit.
- 145 The ambient concentraton represents the 95th percentile of the distribution. Additionally, the 95th percentile of the distribution was calculated using distribution dependent formulae. For normal and lognormal distributions, the 95th percentile calculation used the parameters of the best-fitted regression line drawn through the detected values on the probability plot. For nonparametric distribution, the analytical formula was used (Gilbert 1987).

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EPA. 2002a. "National Recommended Water Quality Criteria: 2002." EPA-822-R-02-047. November.

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TABLE 4-3: SUMMARY OF SELECTED METALS DETECTED IN GROUNDWATER AT CONCENTRATIONS ABOVE CRITERIA

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Well Identification No.	Sample Date	Chemical Concentration (µg/L)			
		Copper	Lead	Nickel	Zinc
IR02MW126A	9/10/2004	11	11.5	4.1 J	221.0
	11/17/2004	5.0 U	5.0 U	5.0 U	157.0
IR02MW300A	9/15/2004	53.0	11.9 J	18.6 J	182 J
	11/30/2004	31.3	10 U	10 U	88.1 J
IR02MW373A	7/23/2002	369	17.6	753.0	4,930
	9/17/2002	241	35.2	452.0	2,970
IR02MWB-2	9/14/2004	6.2 U	25 U	364.0	250 U
	11/22/2004	10.0 U	10.0 U	76.2	100 U
IR03MW218A1	1/24/1992	8.9 U	1.8	28.8 U	5.0
	7/9/1992	25.9 J	23.4	17.3 U	16.5 U
IR03MW226A	7/24/1992	824	613	146	1,180
	8/27/1992	6.4	1.6 U	17.3 U	32.9
IR03MWO-1	7/9/1992	3,240	65.0	1,140	2,400
	8/28/1992	2.2	1.6 U	17.3 U	16.5 U
IR12MW18A	7/18/2002	--	--	123.0	--
	9/5/2002	--	--	127.0	--
PA36MW03A	7/31/2002	264	--	--	621
	9/13/2002	186	--	--	556

Notes: **Bolded** results exceed the criteria

-- Not analyzed

µg/L Microgram per liter

J Estimated concentration

U Not detected

TABLE 4-4: SUMMARY OF SELECTED VOCs DETECTED IN GROUNDWATER AT CONCENTRATIONS ABOVE CRITERIA
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Well Identification No.	Sample Date	Chemical Concentration (µg/L)					
		Benzene	Chloroform	1,1-DCE	Naphthalene	PCE	TCE
IR01MW367A*	9/18/2002	3.3	0.5 U	0.48 J	0.72 J	0.5 U	0.5 U
	7/15/2002	3.4	0.5 U	0.52	0.59 J	0.5 U	0.5 U
IR02MW126A	11/17/2004	0.32 J	0.5 U	0.5 U	10 U	0.5 U	0.5 U
	9/10/2004	1.1 J	0.5 U	0.5 U	6.4 J	0.5 U	0.5 U
IR02MW146A	5/29/1996	2	0.5 U	0.5 U	18 J	0.5 U	0.5 U
	3/26/1996	3	0.5 U	0.5 U	12	0.5 U	0.5 U
IR02MW173A	5/30/1996	0.8	0.5 U	0.5 U	16 J	0.5 U	0.5 U
	3/26/1996	1	0.5 U	0.5 U	31	0.5 U	0.5 U
IR02MW372A	5/10/1996	3	0.5 U	0.5 U	5 J	0.5 U	2
	3/7/1996	2 J	0.5 U	0.5 U	10 U	0.5 U	0.5
IR03MW218A1	7/9/1992	10 U	10 U	10 U	19	10 U	10 U
	1/24/1992	1 J	10 U	10 U	19	10 U	10 U
IR03MW218A2	11/23/2004	5.2	0.5 U	1 U	24	0.5 U	0.5 U
	9/14/2004	7.7 J	0.5 U	1 U	50 U	0.5 U	0.5 U
IR03MW218A3	9/25/2002	0.82	0.5 U	0.5 U	5.2 U	0.5 U	0.12 J
	8/1/2002	0.64	0.5 U	0.5 U	4.8 U	0.5 U	0.43 J
IR03MW225A	4/3/1996	1	0.5 U	0.5 U	10 U	0.5 U	0.5 U
	6/19/1996	3	0.5 U	0.5 U	2 J	0.5 U	0.5 U
IR03MW226A	8/27/1992	4 J	5 U	5 U	10 U	5 U	5 U
	7/24/1992	3 J	5 U	5 U	11	5 U	5 U
IR03MW342A	11/22/2004	0.76	0.5 U	1 U	10 U	0.28 J	0.5 U
	9/14/2004	1.7	0.5 U	1 U	10 U	0.5 U	0.29 J
IR03MW369A	5/20/1996	2	0.5 U	0.5 U	8 J	0.5 U	0.5 U
	3/6/1996	2	0.5 U	0.5 U	29	0.5 U	0.5 U
IR03MW370A	5/16/1996	1	0.5 U	0.5 U	15	0.5 U	0.5 U
	3/6/1996	2	0.5 U	0.5 U	21	0.5 U	0.5 U
IR03MWO-1	8/28/1992	9	5 U	5 U	23	5 U	5 U
	7/9/1992	9	5 U	5 U	10 U	1 J	15
IR04MW13A*	12/6/2004	0.5 U	0.17 J	39	10 U	61	54
	9/16/2004	0.5 U	0.18 J	36	10 U	62	68
IR04MW31A*	9/11/2002	0.5 U	0.5 U	0.5 U	--	0.5 U	0.5 U
	7/23/2002	2.6	0.5 U	0.5 U	--	0.5	0.32
IR04MW36A*	12/2/2004	2.7	0.5 U	1 U	10 U	0.5 U	0.5 U
	9/16/2004	0.5 U	0.5 U	1 U	10 U	0.5 U	0.5 U
IR04MW37A	12/1/2004	0.5 U	0.5 U	1 U	--	0.5 U	7
	9/14/2004	0.5 U	0.5 U	1 U	--	0.5 U	4.9
IR05MW76A	6/19/1992	5 U	5 U	4 J	10 U	2.0 J	5 U
	2/11/1992	5 U	5 U	5 U	11 U	5 U	5 U
IR12MW15A	9/16/2002	1.3	0.5 U	0.21 J	4.8 U	0.5 U	0.23 J
	8/6/2002	0.5 U	0.5 U	0.5 U	4.8 U	0.5 U	0.5 U
IR12MW17A	11/17/2004	7.8	0.5 U	0.33 J	10 U	0.5 U	0.5 U
	9/10/2004	3.3 J	0.5 UJ	0.39 J	10 U	0.5 UJ	0.5 UJ
IR12MW19A	9/11/2002	0.5 U	0.5 U	9.7	--	2.1	2.3
	7/26/2002	0.5 U	0.5 U	14	--	3.8	2.8
IR12MW21A	5/2/1996	0.4 J	0.5 U	0.5 U	10 U	0.5 U	0.5 U
	4/19/2002	0.5 U	--	--	--	--	--
IR14MW12A	4/2/1996	0.5	0.5 U	0.5 U	10 U	0.5 U	0.5 U
	9/16/1992	5 U	5 U	5 U	10 U	5 U	5 U
IR36MW125A	2/26/1992	5 U	2 J	5 U	10 U	5 U	5 U
	11/29/2004	0.5 U	0.5 U	1 U	0.5 U	0.5 U	110
	9/18/2002	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	12

TABLE 4-4: SUMMARY OF SELECTED VOCs DETECTED IN GROUNDWATER AT CONCENTRATIONS ABOVE CRITERIA (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Well Identification No.	Sample Date	Chemical Concentration (µg/L)					
		Benzene	Chloroform	1,1-DCE	Naphthalene	PCE	TCE
IR39MW21A	11/29/2004	71	0.5 U	1 U	10 U	0.5 U	0.5 U
	6/16/2004	0.74	0.5 U	1 U	10 U	0.5 U	0.5 U
IR39MW35A	3/18/1996	0.5 U	0.5 U	0.5 U	10 U	0.5 U	1
	2/14/1996	0.5 UJ	0.5 UJ	0.5 UJ	10 U	0.5 UJ	3 J
IR44MW08A**	11/29/2004	0.5 U	14	1 U	—	0.5 U	0.16 J
	9/13/2004	0.5 U	21	1 U	—	0.5 U	0.5 U
IR74MW01A	11/22/2004	0.5 U	0.32 J	1 U	—	0.5 U	3.3
	9/14/2004	0.5 U	0.27 J	1 U	—	0.5 U	3.4
PA36MW04A	9/11/2002	0.5 U	0.5 U	0.5 U	—	0.5 U	0.13 J
	7/1/2002	0.5 U	0.5 U	0.5 U	—	17	0.55
PA50MW09A	5/2/1996	0.5 U	54	0.5 U	10 U	0.5 U	0.5 U
	3/21/1996	0.5 U	42	0.5 U	10 U	0.5 U	0.5 U

Notes: **Bolded** results exceed the criteria.

* Well is located at Parcel E-2 and included to evaluate spatial distribution of chemical concentrations.

** Well is located at Parcel D and included to evaluate spatial distribution of chemical concentrations.

— Not analyzed

µg/L Microgram per liter

DCE Dichloroethene

J Estimated concentration

PCE Tetrachloroethene

TCE Trichloroethene

U Not detected

VOC Volatile organic compound

TABLE 4-5: SUMMARY OF SELECTED PESTICIDES AND PCBs DETECTED IN GROUNDWATER AT CONCENTRATIONS ABOVE CRITERIA

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Well Identification No.	Sample Date	Chemical Concentration (µg/L)		
		Aroclor-1254	gamma-Chlordane	Heptachlor Epoxide
IR01MW44A*	12/3/2004	0.5 U	0.1 U	0.1 U
	9/15/2004	0.5 U	0.15 U	0.066
IR02MW146A	3/26/1996	0.5 U	0.05 U	0.01 U
	5/29/1996	0.2 J	0.05 U	0.01 U
IR02MW300A	9/15/2004	--	0.05 U	0.05 U
	11/30/2004	--	0.013 J	0.014 J
IR02MW372A	5/10/1996	35	0.3	0.2
	3/26/2001	1	0.05 J	0.02 J
IR02MW372A	9/10/2002	--	0.11	--
	7/17/2002	--	0.0094 U	--
IR02MWB-3	8/27/1992	23	12 U	1.0 U
	3/15/2001	0.1	0.005 U	0.005 U
IR03MW225A	4/3/1996	0.5 U	0.05 U	0.01 U
	6/19/1996	1	0.05 U	0.01 U
IR03MW370A	3/6/1996	0.5 U	0.05 U	0.01
	5/16/1996	0.5 U	0.05 U	0.01 U
IR11MW25A	11/25/1991	1.0 U	0.5 U	0.05 U
	3/9/2001	0.1 U	0.005	0.005 U
IR12MW17A	9/10/2004	--	0.05 U	0.0073 J
	11/17/2004	--	0.05 U	0.05 U
PA36MW04A	7/24/2002	--	0.0094 U	--
	9/11/2002	--	0.013 J	--

Notes: This table supports Figure 4-5 (Selected Pesticide and PCBs Concentrations in A-aquifer Groundwater); other pesticides or PCBs detected in groundwater are summarized in redevelopment block-specific tables (Statistical Analysis of Groundwater Data).

Bolded results exceed the criteria.

* Well is located at Parcel E-2 and included to evaluate spatial distribution of chemical concentrations.

-- Not analyzed

µg/L Microgram per liter

J Estimated concentration

PCB Polychlorinated biphenyl

U Not detected

TABLE 4-6: SUMMARY OF TPH DETECTED IN GROUNDWATER AT CONCENTRATIONS ABOVE CRITERIA

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Well Identification No.	Sample Date	Chemical Concentration (µg/L)
		TTPH
IR02MW173A	5/30/1996	4,180.0
	3/26/1996	6,600.0
IR03MW369A	5/20/1996	4,300.0
	3/6/1996	13,500.0
IR03MW218A2	11/23/2004	9,190.0
	9/14/2004	290.0
IR03MW225A	6/19/1996	8,000.0
	4/3/1996	3,930.0
IR03MW370A	5/16/1996	6,110.0
	3/6/1996	12,900.0
IR03MW371A	5/16/1996	1,682.0
	3/6/1996	7,846.0

Notes: **Bolded** results exceed criteria

µg/L Microgram per liter

TTPH Total total petroleum hydrocarbons

TABLE 4.3.1-1: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 31A SOIL DATA (0 TO 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected Conc. to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected Conc. to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Arsenic ^a	6	3	50.0	11.1	0.038	159.34	0.434	14.07	6.1	0.0	100.0	100.0	0.0	100.0	100.0
METAL	Iron	6	6	100.0	NA	21,963	2.75	613,200	0.10	60,500	NA	100.0	0.0	NA1	NA1	NA1
METAL	Manganese ^b	6	6	100.0	1431.2	843	5.99	32,251	0.16	5,050	33.3	50.0	0.0	NA1	NA1	NA1
METAL	Nickel ^c	6	6	100.0	551.9-4772	302	7.35	20,692	0.11	2,220	0.0	66.7	0.0	NA1	NA1	NA1
METAL	Vanadium ^b	6	6	100.0	117.2	64.8	3.22	2,044	0.10	209	33.3	66.7	0.0	NA1	NA1	NA1
SVOC	Bis(2-ethylhexyl)phthalate	6	1	16.7	NA	1.14	2.54	176	0.02	2.9	NA	100.0	0.0	NA	20.0	0.0

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.
See Appendix C for full statistical analysis.

^a Chemical not selected for nature and extent evaluation based on HPAL factor.

^b Chemical not selected for nature and extent evaluation based on maximum detection factor (maximum detect less than 30 times residential criteria).

^c The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

bgs Below ground surface

Conc. Concentration

HPAL Hunters Point ambient level (for soil)

mg/kg Milligram per kilogram

NA Not applicable

NA1 Not applicable; chemical detected in all samples

PQL Practical quantitation limit

SVOC Semivolatile organic compound

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.2-1: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 31B/36 SOIL DATA (0 TO 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detections (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL	Nondetects Greater than Residential Criteria	Nondetects Greater than Industrial Criteria
METAL	Arsenic	178	121	68	11.1	0.04	3,396	0.434	299.76	130	12.4	100.0	100.0	0.0	100.0	80.7
METAL	Cadmium	178	68	38.2	3.14	3.46	1.04	983	0.00	3.60	1.5	1.5	0.0	0.0	0.0	0.0
METAL	Copper	178	177	99.4	124.3	159	54.0	75,628	0.11	8,600	15.8	13.6	0.0	0.0	0.0	0.0
METAL	Iron	178	178	100	NA	21,963	3.14	613,200	0.11	69,000	NA	84.8	0.0	NA1	NA1	NA1
METAL	Lead	178	146	82.0	8.99	155	6.13	800	1.23	980	35.6	6.9	0.7	3.1	0.0	0.0
METAL	Manganese	178	177	99.4	1,431	843	9.50	32,251	0.25	8,010	13.0	46.9	0.0	0.0	100.0	0.0
METAL	Mercury	174	88	50.6	2.28	1.59	23.6	611	0.06	37.60	17.1	19.3	0.0	0.0	0.0	0.0
METAL	Nickel ^a	178	178	100	45.19-8,872	302	6.59	20,692	0.10	1,990	0.0	32.0	0.0	NA1	NA1	NA1
METAL	Thallium	174	7	4.0	0.81	5.02	1.19	135	0.04	6.00	42.9	14.3	0.0	6.0	3.0	0.0
METAL	Vanadium	178	178	100	117.2	64.8	2.51	2,044	0.08	163	5.6	48.3	0.0	NA1	NA1	NA1
METAL	Zinc	178	178	100	109.9	373	4.29	613,200	0.00	1,600	15.7	6.2	0.0	NA1	NA1	NA1
PCB	Aroclor-1260	177	3	1.7	NA	0.211	2.65	1.00	0.56	0.560	NA	33.3	0.0	NA	2.3	0.0
PEST	alpha-BHC	177	1	0.6	NA	0.002	5.81	0.594	0.02	0.011	NA	100.0	0.0	NA	95.5	0.0
SVOC	Benzo(a)anthracene	201	15	7.5	NA	0.370	3.24	1.76	0.68	1.20	NA	20.0	0.0	NA	41.4	6.5
SVOC	Benzo(a)pyrene	199	14	7.0	NA	0.037	32.2	0.176	6.83	1.20	NA	92.9	28.6	NA	99.5	96.2
SVOC	Benzo(b)fluoranthene	198	33	16.7	NA	0.338	6.21	1.76	1.20	2.10	NA	24.2	3.0	NA	86.1	9.1
SVOC	Benzo(k)fluoranthene	198	5	2.5	NA	0.338	2.90	1.76	0.56	0.980	NA	40.0	0.0	NA	78.2	7.3
SVOC	Bis(2-ethylhexyl)phthalate ^b	173	4	2.3	NA	1.14	42.0	176	0.27	48.0	NA	50.0	0.0	NA	10.1	0.0
SVOC	Chrysene	201	30	14.9	NA	3.30	1.18	17.6	0.22	3.90	NA	3.3	0.0	NA	5.3	0.6
SVOC	Dibenz(a,h)anthracene	198	3	1.5	NA	0.058	1.90	0.289	0.38	0.110	NA	33.3	0.0	NA	99.5	79.0
SVOC	Indeno(1,2,3-cd)pyrene	199	7	3.5	NA	0.347	1.99	1.76	0.39	0.690	NA	28.6	0.0	NA	68.2	7.8
SVOC	n-Nitrosodiphenylamine	174	9	5.2	NA	0.679	3.39	274	0.01	2.30	NA	11.1	0.0	NA	11.5	0.0
VOC	Naphthalene ^c	218	26	11.9	NA	1.67	3.96	4.65	1.42	6.60	NA	7.7	7.7	NA	6.3	4.2
VOC	Trichloroethene ^c	158	35	22.2	NA	2.94	3.74	6.56	1.68	11	NA	2.9	2.9	NA	0.8	0.0

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded HPALs or residential screening criteria.
See Appendix C for full statistical analysis.

a The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

b Chemical not selected for nature and extent evaluation based on PQL factor

c Chemical not selected for nature and extent evaluation based on the percent of detections and the low number of detections that exceeded criteria.

bgs Below ground surface
BHC Benzene hexachloride
Conc. Concentration
HPAL Hunters Point ambient level (for soil)
mg/kg Milligram per kilogram
NA Not applicable
NA1 Not applicable; chemical detected in all samples
PCB Polychlorinated biphenyl
PEST Pesticide
PQL Practical quantitation limit
SVOC Semivolatile organic compound
VOC Volatile organic compound

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California," August 4.

TABLE 4.3.2-2: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 31B/36 SOIL DATA (DEEPER THAN 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections /Analyses (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected to Industrial Criteria	Maximum Detected Conc.	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Arsenic ^a	120	84	70.0	11.1	0.038	580	0.434	51.2	22.2	2.4	100.0	98.8	0.0	100.0	41.7
METAL	Iron	120	120	100.0	NA	21,963	2.93	613,200	0.105	64,400	NA	77.5	0.0	NA1	NA1	NA1
METAL	Manganese	120	120	100.0	1,431	843	21.5	32,251	0.561	18,100	2.5	10.8	0.0	NA1	NA1	NA1
METAL	Nickel ^b	120	120	100.0	29.1-4,731 ^b	302	5.40	20,692	0.079	1,630	0.8	29.2	0.0	NA1	NA1	NA1
METAL	Thallium	113	5	4.4	0.81	5.02	4.62	135	0.172	23.2	80.0	20.0	0.0	0.9	0.0	0.0
METAL	Vanadium	120	120	100.0	117.2	64.8	1.93	2,044	0.061	125	2.5	39.2	0.0	NA1	NA1	NA1
SVOC	Benzo(a)anthracene	118	4	3.4	NA	0.370	1.81	1.76	0.382	0.670	NA	25.0	0.0	NA	83.3	0.9
SVOC	Benzo(a)pyrene	117	5	4.3	NA	0.037	17.7	0.176	3.76	0.660	NA	40.0	20.0	NA	100.0	100.0
SVOC	Benzo(b)fluoranthene	117	6	5.1	NA	0.338	2.96	1.76	0.570	1.00	NA	16.7	0.0	NA	100.0	0.9
SVOC	Benzo(k)fluoranthene	117	3	2.6	NA	0.338	1.00	1.76	0.194	0.340	NA	33.3	0.0	NA	100.0	0.9
VOC	Trichloroethene ^c	119	6	5.0	NA	2.94	16.6	6.56	7.46	49.0	NA	50.0	50.0	NA	0.0	0.0
VOC	Vinyl Chloride ^c	119	1	0.8	NA	0.024	16.8	0.055	7.51	0.410	NA	100.0	100.0	NA	4.2	4.2

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded HPALs or residential screening criteria.
See Appendix C for full statistical analysis.

a Metal selection is based on samples from 0 to 10 feet bgs.

b The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

c Chemical not selected for nature and extent evaluation based on the percent of detections and the low number of detections that exceeded criteria.

bgs Below ground surface

Conc. Concentration

HPAL Hunters Point ambient level (for soil)

mg/kg Milligram per kilogram

NA Not applicable

NA1 Not applicable; chemical detected in all samples

PQL Practical quantitation limit

SVOC Semivolatile organic compound

VOC Volatile organic compound

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.2-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 31B/36 GROUNDWATER DATA, A-AQUIFER

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Maximum Detected Conc. (µg/L)	Detects Greater than HGAL (%)	Detects Greater than Vapor Intrusion Criteria (%)	Detects Greater than Surface Water Criteria (%)	Nondetects Greater than HGAL (%)	Nondetects Greater than Vapor Intrusion Criteria (%)	Nondetects Greater than Surface Water Criteria (%)
METAL	Aluminum	30	8	26.7	NA	NA	NA	209	NA	NA	NA	NA	NA	NA
METAL	Antimony	30	3	10.0	43.26	NA	NA	2.7	0.0	NA	NA	0.0	NA	NA
METAL	Arsenic	30	18	60.0	27.34	NA	36	15.4	0.0	NA	0.0	0.0	NA	0.0
METAL	Barium	30	30	100.0	504.2	NA	NA	242	0.0	NA	NA	NA1	NA1	NA1
METAL	Cadmium	30	1	3.3	5.08	NA	8.8	0.31	0.0	NA	0.0	0.0	NA	0.0
METAL	Calcium	30	30	100.0	NA	NA	NA	396,000	NA	NA	NA	NA1	NA1	NA1
METAL	Chromium	30	7	23.3	15.66	NA	50	11	0.0	NA	0.0	0.0	NA	0.0
METAL	Cobalt	30	15	50.0	20.8	NA	NA	24.1	13.3	NA	NA	0.0	NA	NA
METAL	Copper	33	6	18.2	28.04	NA	3.1	38.5	16.7	NA	83.3	0.0	NA	25.9
METAL	Iron	30	13	43.3	2380	NA	NA	291	0.0	NA	NA	0.0	NA	NA
METAL	Lead	30	1	3.3	14.44	NA	5.6	1.8	0.0	NA	0.0	0.0	NA	0.0
METAL	Magnesium	30	30	100.0	1,440,000	NA	NA	752,000	0.0	NA	NA	NA1	NA1	NA1
METAL	Manganese	30	28	93.3	8140	NA	NA	5,450	0.0	NA	NA	0.0	NA	NA
METAL	Molybdenum	30	19	63.3	61.9	NA	NA	45.1	0.0	NA	NA	0.0	NA	NA
METAL	Nickel	30	19	63.3	96.48	NA	8.2	46.1	0.0	NA	47.4	0.0	NA	9.1
METAL	Potassium	30	30	100.0	448,000	NA	NA	155,000	0.0	NA	NA	NA1	NA1	NA1
METAL	Selenium	28	9	32.1	14.5	NA	71	7	0.0	NA	0.0	0.0	NA	0.0
METAL	Silver	30	1	3.3	7.43	NA	0.38	0.98	0.0	NA	100.0	0.0	NA	100.0
METAL	Sodium	30	30	100.0	9,242,000	NA	NA	5,120,000	0.0	NA	NA	NA1	NA1	NA1
METAL	Thallium	28	2	7.1	12.97	NA	426	4	0.0	NA	0.0	0.0	NA	0.0
METAL	Vanadium	30	21	70.0	26.62	NA	NA	16.9	0.0	NA	NA	0.0	NA	NA
METAL	Zinc	30	8	26.7	75.68	NA	81	78.1	25.0	NA	0.0	0.0	NA	0.0
VOC	1,1-Dichloroethene	54	1	1.9	NA	190	44,800	0.3	NA	0.0	0.0	NA	0.0	0.0
VOC	1,2,4-Trichlorobenzene	55	1	1.8	NA	66	129	0.3	NA	0.0	0.0	NA	0.0	0.0
VOC	1,2-Dichlorobenzene	55	1	1.8	NA	2,600	129	32	NA	0.0	0.0	NA	0.0	0.0
VOC	1,2-Dichloroethene (total)	29	7	24.1	NA	210	44,800	580	NA	42.9	0.0	NA	0.0	0.0
VOC	1,3-Dichlorobenzene	55	1	1.8	NA	1,300	129	0.33	NA	0.0	0.0	NA	0.0	0.0
VOC	1,4-Dichlorobenzene	55	1	1.8	NA	2.1	129	7.8	NA	100.0	0.0	NA	55.6	0.0
VOC	Carbon Disulfide	41	4	9.8	NA	560	NA	10	NA	0.0	NA	NA	0.0	NA
VOC	cis-1,2-Dichloroethene	25	6	24.0	NA	210	44,800	140	NA	0.0	0.0	NA	0.0	0.0
VOC	Isopropylbenzene	8	1	12.5	NA	7.8	NA	0.12	NA	0.0	NA	NA	0.0	NA
VOC	Tetrachloroethene	54	1	1.9	NA	0.54	450	17	NA	100.0	0.0	NA	22.6	0.0
VOC	Toluene	54	3	5.6	NA	1,400	5,000	0.5	NA	0.0	0.0	NA	0.0	0.0
VOC	trans-1,2-Dichloroethene	25	4	16.0	NA	180	44,800	5.4	NA	0.0	0.0	NA	0.0	0.0
VOC	Trichloroethene	55	28	50.9	NA	2.9	400	1,000	NA	35.7	10.7	NA	14.8	0.0
VOC	Vinyl Chloride	54	4	7.4	NA	0.028	NA	25	NA	100.0	NA	NA	100.0	NA
VOC	Xylene (total)	46	1	2.2	NA	340	NA	0.8	NA	0.0	NA	NA	0.0	NA
PEST	4,4'-DDT	39	1	2.6	NA	NA	0.001	0.01	NA	NA	100.0	NA	NA	100.0
PEST	Aldrin	39	1	2.6	NA	NA	0.26	0.05	NA	NA	0.0	NA	NA	2.6
PEST	delta-BHC	39	1	2.6	NA	NA	NA	0.03	NA	NA	NA	NA	NA	NA
PEST	Endosulfan II	39	1	2.6	NA	NA	0.0087	0.01	NA	NA	100.0	NA	NA	100.0

TABLE 4.3.2-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 31B/36 GROUNDWATER DATA, A-AQUIFER (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Maximum Detected Conc. (µg/L)	Detects Greater than HGAL (%)	Detects Greater than Vapor Intrusion Criteria (%)	Detects Greater than Surface Water Criteria (%)	Nondetects Greater than HGAL (%)	Nondetects Greater than Vapor Intrusion Criteria (%)	Nondetects Greater than Surface Water Criteria (%)
PEST	Endosulfan Sulfate	39	1	2.6	NA	NA	NA	0.002	NA	NA	NA	NA	NA	NA
PEST	Endrin	39	1	2.6	NA	NA	0.0023	0.004	NA	NA	100.0	NA	NA	100.0
PEST	Endrin Aldehyde	39	1	2.6	NA	NA	NA	0.001	NA	NA	NA	NA	NA	NA
PEST	gamma-Chlordane	39	1	2.6	NA	NA	0.004	0.013	NA	NA	100.0	NA	NA	100.0
PEST	Heptachlor	39	2	5.1	NA	NA	0.0036	0.017	NA	NA	100.0	NA	NA	100.0
PEST	Methoxychlor	39	1	2.6	NA	NA	0.003	0.01	NA	NA	100.0	NA	NA	100.0
PEST	Total chlordane	39	2	5.1	NA	NA	NA	0.0705	NA	NA	NA	NA	NA	NA
PEST	Total DDT	39	1	2.6	NA	NA	NA	0.104	NA	NA	NA	NA	NA	NA
TPHEXT	Diesel-range organics	30	10	33.3	NA	NA	20,000	860	NA	NA	0.0	NA	NA	0.0
TPHPRG	Gasoline-range organics	30	5	16.7	NA	NA	20,000	910	NA	NA	0.0	NA	NA	0.0
TPHEXT	Motor oil-range organics	29	17	58.6	NA	NA	20,000	570	NA	NA	0.0	NA	NA	0.0
TPHPRG	TPH-purgeable unknown hydrocarbon	3	1	33.3	NA	NA	NA	25	NA	NA	NA	NA	NA	NA
TRPH	TRPH	27	3	11.1	NA	NA	NA	500	NA	NA	NA	NA	NA	NA

Notes: Data presented for all analytes detected in at least one sample.

See Appendix D for full statistical analysis.

Bold values indicate criterion was exceeded. **Bold** and shaded chemicals indicate chemical was retained for discussion of nature and extent.

Total TPH groundwater criteria are based on distance from the shoreline and are listed in Table 4-1. All wells in Redevelopment Block 31B/36 are located more than 250 feet from the shoreline; therefore, the total TPH groundwater criterion for Redevelopment Block 31B/36 is 20,000 µg/L.

µg/L	Microgram per liter
BHC	Benzene hexachloride
Conc.	Concentration
DDT	Dichlorodiphenyltrichloroethane
HGAL	Hunters Point groundwater ambient level
NA	Not applicable
NA1	Not applicable; chemical detected in all samples
PEST	Pesticide
TPH	Total petroleum hydrocarbons
TPHEXT	Total petroleum hydrocarbons - extractable
TPHPRG	Total petroleum hydrocarbons - purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compound

TABLE 4.3.2-4: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 31B/36 GROUNDWATER DATA, B-AQUIFER
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	Domestic Use Criteria (µg/L)	Surface Water Criteria (µg/L)	MCL (µg/L)	Maximum Detected Conc. (µg/L)	Ratio of Maximum Detection Conc. to Domestic Use Criteria	Ratio of Maximum Detection Conc. to Surface Water Criteria	Ratio of Maximum Detection to MCL	Detects Greater than Domestic Use Criteria (%)	Detects Greater than Surface Water Criteria (%)	Detects Greater than MCL (%)	Nondetects Greater than Domestic Use Criteria (%)	Nondetects Greater than Surface Water Criteria (%)	Nondetects Greater than MCL (%)
METAL	Arsenic	9	3	33.3	0.007	36	10	2.8	400	0.08	0.28	100.0	0.0	0.0	100.0	0.0	0.0
METAL	Barium	9	9	100.0	7300	NA	1,000	119	0.02	NA	0.12	0.0	NA	0.0	NA1	NA1	NA1
METAL	Calcium	9	9	100.0	NA	NA	NA	90,900	NA	NA	NA	NA	NA	NA	NA1	NA1	NA1
METAL	Chromium	9	3	33.3	55,000	50	50	18.2	0	0.36	0.36	0.0	0.0	0.0	0.0	0.0	0.0
METAL	Cobalt	9	4	44.4	730	NA	NA	2.7	0	NA	NA	0.0	NA	NA	0.0	NA	NA
METAL	Copper	9	2	22.2	1,500	3.1	1300	8.2	0.01	2.65	0.01	0.0	50.0	0.0	0.0	0.0	0.0
METAL	Iron	9	6	66.7	11,000	NA	NA	171	0.02	NA	NA	0.0	NA	NA	0.0	NA	NA
METAL	Magnesium	9	9	100.0	NA	NA	NA	180,000	NA	NA	NA	NA	NA	NA	NA1	NA1	NA1
METAL	Manganese	9	9	100.0	880	NA	NA	2160	2.45	NA	NA	66.7	NA	NA	NA1	NA1	NA1
METAL	Molybdenum	9	2	22.2	180	NA	NA	1.4	0.01	NA	NA	0.0	NA	NA	0.0	NA	NA
METAL	Nickel	9	4	44.4	730	8.2	100	4.7	0.01	0.57	0.05	0.0	0.0	0.0	0.0	0.0	0.0
METAL	Potassium	9	9	100.0	NA	NA	NA	39,900	NA	NA	NA	NA	NA	NA	NA1	NA1	NA1
METAL	Selenium	9	1	11.1	180	71	50	2.7	0.02	0.04	0.05	0.0	0.0	0.0	0.0	0.0	0.0
METAL	Silver	9	1	11.1	180	0.38	100	0.68	0	1.79	0.01	0.0	100.0	0.0	0.0	100.0	0.0
METAL	Sodium	9	9	100.0	NA	NA	NA	252,000	NA	NA	NA	NA	NA	NA	NA1	NA1	NA1
METAL	Thallium	9	1	11.1	2.4	426	2	4	1.67	0.01	2	100.0	0.0	100.0	0.0	0.0	12.5
METAL	Vanadium	9	8	88.9	36	NA	NA	4.5	0.13	NA	NA	0.0	NA	NA	0.0	NA	NA
METAL	Zinc	9	3	33.3	11,000	81	NA	32.5	0	0.4	NA	0.0	0.0	NA	0.0	0.0	NA
VOC	1,2,4-Trichlorobenzene	27	1	3.7	7.2	129	70	0.37	0.05	0	0.01	0.0	0.0	0.0	34.6	0.0	0.0
VOC	1,2-Dichlorobenzene	27	3	11.1	370	129	600	35	0.09	0.27	0.06	0.0	0.0	0.0	0.0	0.0	0.0
VOC	1,3-Dichlorobenzene	27	1	3.7	180	129	NA	0.66	0	0.01	NA	0.0	0.0	NA	0.0	0.0	NA
VOC	1,4-Dichlorobenzene	27	3	11.1	0.3	129	5	17	56.67	0.13	3.4	100.0	0.0	33.3	100.0	0.0	0.0
VOC	Carbon disulfide	18	2	11.1	1,000	NA	NA	0.7	0	NA	NA	0.0	NA	NA	0.0	NA	NA
VOC	cis-1,2-Dichloroethene	18	1	5.6	61	44,800	6	0.61	0.01	0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
VOC	Tetrachloroethene	27	3	11.1	0.1	450	5	41	410	0.09	8.2	100.0	0.0	66.7	100.0	0.0	0.0
VOC	Toluene	27	2	7.4	720	5,000	150	0.18	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
VOC	Trichloroethene	27	2	7.4	1.4	400	5	1.5	1.07	0	0.3	50.0	0.0	0.0	0.0	0.0	0.0
VOC	Vinyl Chloride	27	1	3.7	0.032	NA	0.5	1.3	40.63	NA	2.6	100.0	NA	100.0	100.0	NA	0.0
TPHEXT	Motor oil-range organics	9	2	22.2	NA	20,000	NA	67	NA	0	NA	NA	0.0	NA	NA	0.0	NA
TPHPRG	Gasoline-range organics	9	2	22.2	NA	20,000	NA	33	NA	0	NA	NA	0.0	NA	NA	0.0	NA
TRPH	TRPH	9	1	11.1	NA	NA	NA	900	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes: Data presented for all analytes detected in at least one sample.

See Appendix D for full statistical analysis.

Bold values indicate criterion was exceeded. **Bold** and shaded chemicals indicate chemical was retained for discussion of nature and extent.

Total TPH groundwater criteria are based on distance from the shoreline and are listed in Table 4-1. All wells in Redevelopment Block 31B/36 are located more than 250 feet from the shoreline; therefore, the total TPH groundwater criterion for Redevelopment Block 31B/36 is 20,000 µg/L.

µg/L Microgram per liter
Conc. Concentration
MCL Maximum contaminant level
NA Not applicable
NA1 Not applicable; chemical detected in all samples
TPH Total petroleum hydrocarbons
TPHEXT Total petroleum hydrocarbons - extractable
TPHPRG Total petroleum hydrocarbons - purgeable
TRPH Total recoverable petroleum hydrocarbons
VOC Volatile organic compound

TABLE 4.3.3-1: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 40 SOIL DATA (0 TO 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected Conc. to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected Conc. to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Antimony ^a	49	17	34.7	9.05	10.2	3.82	818	0.05	39	5.9	5.9	0.0	6.3	3.1	0.0
METAL	Arsenic ^b	51	38	74.5	11.1	0.038	470.18	0.434	41.51	18	5.3	100.0	100.0	0.0	100.0	84.6
METAL	Cadmium ^a	51	13	25.5	3.14	3.46	5.96	983	0.02	20.6	7.7	7.7	0.0	0.0	0.0	0.0
METAL	Copper ^a	51	51	100.0	124.3	159	18.97	75,628	0.04	3,020	11.8	7.8	0.0	NA1	NA1	NA1
METAL	Iron	51	51	100.0	NA	21,963	5.01	613,200	0.18	110,000	NA	92.2	0.0	NA1	NA1	NA1
METAL	Lead ^a	51	35	68.6	8.99	155	4.64	800	0.93	742	28.6	8.6	0.0	0.0	0.0	0.0
METAL	Manganese ^a	51	51	100.0	1431.2	843	7.84	32,251	0.20	6,610	11.8	54.9	0.0	NA1	NA1	NA1
METAL	Mercury	51	27	52.9	2.28	1.59	1.26	611	0.00	2	0.0	11.1	0.0	0.0	0.0	0.0
METAL	Nickel ^c	51	50	98.0	44.1-3287	302	4.63	20,692	0.07	1,400	0.0	36.0	0.0	0.0	0.0	0.0
METAL	Vanadium ^a	51	51	100.0	117.2	64.8	6.20	2,044	0.20	402	11.8	72.6	0.0	NA1	NA1	NA1
METAL	Zinc ^a	51	51	100.0	109.9	373	5.41	613,200	0.00	2,020	19.6	5.9	0.0	NA1	NA1	NA1
PCB	Aroclor-1254 ^d	50	1	2.0	NA	0.093	36.57	1.00	3.38	3.4	NA	100.0	100.0	NA	30.6	0.0
PCB	Aroclor-1260 ^d	50	8	16.0	NA	0.211	13.27	1.00	2.79	2.8	NA	12.5	12.5	NA	2.4	0.0
SVOC	Benzo(a)pyrene ^d	49	3	6.1	NA	0.037	8.85	0.176	1.88	0.33	NA	100.0	33.3	NA	100.0	97.8
SVOC	Bis(2-Ethylhexyl)phthalate	50	1	2.0	NA	1.14	1.14	176	0.01	1.3	NA	100.0	0.0	NA	2.0	0.0

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.

See Appendix C for full statistical analysis.

a Chemical not selected for nature and extent evaluation based on maximum detection factor (maximum detect less than 30 times residential criteria).

b Chemical not selected for nature and extent evaluation based on HPAL factor.

c The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

d Chemical not selected for nature and extent evaluation based on the percent of detections and the low number of detections exceeding criteria.

bgs Below ground surface

Conc. Concentration

HPAL Hunters Point ambient level (for soil)

mg/kg Milligram per kilogram

NA Not applicable

NA1 Not applicable; chemical detected in all samples

PCB Polychlorinated biphenyl

PQL Practical quantitation limit

SVOC Semivolatile organic chemical

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.3-2: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 40 SOIL DATA (DEEPER THAN 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected Conc. to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected Conc. to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Antimony	17	13	76.5	9.05	10.2	3.51	818	0.04	35.9	7.7	7.7	0.0	25.0	25.0	0.0
METAL	Arsenic ^a	17	10	58.8	11.1	0.038	182.85	0.434	16.14	7	0.0	100.0	100.0	0.0	100.0	57.1
METAL	Iron	17	17	100.0	NA	21,963	2.64	613,200	0.09	58,000	NA	88.2	0.0	NA1	NA1	NA1
METAL	Manganese	17	17	100.0	1431.2	843	1.35	32,251	0.04	1,140	0.0	23.5	0.0	NA1	NA1	NA1
METAL	Nickel ^b	17	17	100.0	109.4-3,015	302	3.24	20,692	0.05	979	0.0	47.1	0.0	NA1	NA1	NA1
METAL	Vanadium	17	17	100.0	117.2	64.8	2.70	2,044	0.09	175	11.8	82.4	0.0	NA1	NA1	NA1
SVOC	Benzo(a)anthracene	17	1	5.9	NA	0.370	1.35	1.76	0.28	0.5	NA	100.0	0.0	NA	100.0	0.0
SVOC	Benzo(a)pyrene ^c	17	1	5.9	NA	0.037	5.36	0.176	1.14	0.2	NA	100.0	100.0	NA	100.0	100.0

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.

See Appendix C for full statistical analysis.

a Metal selection is based on samples from 0 to 10 feet bgs.

b The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

c Chemical not selected for nature and extent evaluation based on the percent of detections and the low number of detections exceeding criteria.

bgs Below ground surface

Conc. Concentration

HPAL Hunters Point ambient level (for soil)

mg/kg Milligram per kilogram

NA Not applicable

NA1 Not applicable; chemical detected in all samples

PQL Practical quantitation limit

SVOC Semivolatile organic compound

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California," August 4.

TABLE 4.3.3-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 40 GROUNDWATER DATA, A-AQUIFER

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Maximum Detected Concentration (µg/L)	Detects Greater than HGAL (%)	Detects Greater than Vapor Intrusion Criteria (%)	Detects Greater than Surface Water Criteria (%)	Nondetect Greater than HGAL (%)	Nondetect Greater than Vapor Intrusion Criteria (%)	Nondetect Greater than Surface Water Criteria (%)
METAL	Antimony	15	4	26.7	43.26	NA	NA	43.6	25.0	NA	NA	9.1	NA	NA
METAL	Arsenic	15	6	40.0	27.34	NA	36	5.4	0.0	NA	0.0	11.1	NA	0.0
METAL	Barium	15	14	93.3	504.2	NA	NA	377	0.0	NA	NA	0.0	NA	NA
METAL	Cadmium	15	1	6.7	5.08	NA	8.8	12.6	100.0	NA	100.0	0.0	NA	0.0
METAL	Calcium	13	13	100.0	NA	NA	NA	504,000	NA	NA	NA	NA1	NA1	NA1
METAL	Cobalt	12	6	50.0	20.8	NA	NA	7.3	0.0	NA	NA	16.7	NA	NA
METAL	Copper	12	2	16.7	28.04	NA	3.1	4.6	0.0	NA	50.0	0.0	NA	30.0
METAL	Iron	13	3	23.1	2,380	NA	NA	343	0.0	NA	NA	0.0	NA	NA
METAL	Lead	15	3	20.0	14.44	NA	5.6	18	33.3	NA	33.3	8.3	NA	8.3
METAL	Magnesium	13	13	100.0	1,440,000	NA	NA	901,000	0.0	NA	NA	NA1	NA1	NA1
METAL	Manganese	12	11	91.7	8140	NA	NA	11,800	18.2	NA	NA	0.0	NA	NA
METAL	Mercury	12	1	8.3	0.6	NA	0.025	0.26	0.0	NA	100.0	0.0	NA	100.0
METAL	Molybdenum	12	7	58.3	61.9	NA	NA	300	42.9	NA	NA	0.0	NA	NA
METAL	Nickel	15	4	26.7	96.48	NA	8.2	13.4	0.0	NA	50.0	0.0	NA	27.3
METAL	Potassium	13	13	100.0	448,000	NA	NA	194,000	0.0	NA	NA	NA1	NA1	NA1
METAL	Selenium	12	4	33.3	14.5	NA	71	3.4	0.0	NA	0.0	12.5	NA	0.0
METAL	Sodium	13	13	100.0	9,242,000	NA	NA	5,230,000	0.0	NA	NA	NA1	NA1	NA1
METAL	Thallium	11	2	18.2	12.97	NA	426	10.5	0.0	NA	0.0	22.2	NA	0.0
METAL	Vanadium	12	7	58.3	26.62	NA	NA	29.6	14.3	NA	NA	0.0	NA	NA
METAL	Zinc	12	1	8.3	75.68	NA	81	15.2	0.0	NA	0.0	0.0	NA	0.0
TPHEXT	Diesel-Range Organics	14	1	7.1	NA	NA	20,000	76	NA	NA	0.0	NA	NA	0.0
TPHEXT	Motor Oil-Range Organics	10	4	40.0	NA	NA	20,000	970	NA	NA	0.0	NA	NA	0.0
TPHPRG	Gasoline-Range Organics	14	1	7.1	NA	NA	20,000	29	NA	NA	0.0	NA	NA	0.0

Notes: Data presented for all analytes detected in at least one sample.

Bolded values indicates criterion exceeded. **Bolded and shaded** chemicals indicate the chemical was retained for evaluation of its spatial distribution in groundwater.

See Appendix D for full statistical analysis.

Total TPH groundwater criteria are based on distance from the shoreline and are listed in Table 4-1. All wells in Redevelopment Block 40 are located more than 250 feet from the shoreline; therefore, the total TPH groundwater criterion for Redevelopment Block 40 is 20,000 µg/L.

µg/L Microgram per liter

HGAL Hunters Point groundwater ambient level

NA Not applicable

NA1 Not applicable; chemical detected in all samples

TPH Total petroleum hydrocarbons

TPHEXT Total petroleum hydrocarbons - extractable

TPHPRG Total petroleum hydrocarbons - purgeable

TABLE 4.3.4-1: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 41 SOIL DATA (0 TO 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected Conc. to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected Conc. to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Antimony ^a	67	13	19.4	9.05	10.2	1.66	818	0.02	17	23.1	15.4	0.0	7.4	5.6	0.0
METAL	Arsenic ^b	136	98	72.1	11.1	0.038	336.96	0.434	29.75	12.9	2.0	100.0	98.0	0.0	100.0	94.7
METAL	Iron	71	71	100.0	NA	21,963	3.60	613,200	0.13	79,000	NA	93.0	0.0	NA1	NA1	NA1
METAL	Manganese ^a	71	71	100.0	1,431.2	843	3.01	32,251	0.08	2,540	9.9	53.5	0.0	NA1	NA1	NA1
METAL	Mercury ^a	72	33	45.8	2.28	1.59	2.51	611	0.01	4	3.0	3.0	0.0	0.0	0.0	0.0
METAL	Nickel ^c	71	71	100.0	66.3-4,752	302	6.22	20,692	0.09	1,880	0.0	38.0	0.0	NA1	NA1	NA1
METAL	Vanadium ^a	71	71	100.0	117.2	64.8	2.91	2,044	0.09	189	14.1	60.6	0.0	NA1	NA1	NA1
METAL	Zinc ^a	71	71	100.0	109.9	373	1.20	613,200	0.00	449	19.7	1.4	0.0	NA1	NA1	NA1
PCB	Aroclor-1260	178	43	24.2	NA	0.211	3.98	1.00	0.84	0.84	NA	32.6	0.0	NA	11.1	4.4
PEST	4,4'-DDD	89	12	13.5	NA	2.14	1.40	17.1	0.18	3	NA	8.3	0.0	NA	0.0	0.0
PEST	4,4'-DDE	89	12	13.5	NA	1.56	1.54	12.1	0.20	2.4	NA	8.3	0.0	NA	0.0	0.0
SVOC	Benzo(a)anthracene	95	13	13.7	NA	0.370	1.11	1.76	0.23	0.41	NA	7.7	0.0	NA	52.4	4.9
SVOC	Benzo(a)pyrene ^d	95	9	9.5	NA	0.037	6.16	0.176	1.31	0.23	NA	88.9	11.1	NA	100.0	98.8
SVOC	Benzo(b)fluoranthene	95	15	15.8	NA	0.338	1.36	1.76	0.26	0.46	NA	13.3	0.0	NA	77.5	3.8

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.

See Appendix C for full statistical analysis.

a Chemical not selected for nature and extent evaluation based on maximum detection factor (maximum detect less than 30 times residential criteria).

b Chemical not selected for nature and extent evaluation based on HPAL factor.

c The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

d Chemical not selected for nature and extent evaluation based on PQL factor.

bgs Below ground surface

Conc. Concentration

DDD Dichlorodiphenyldichloroethane

DDE Dichlorodiphenyldichloroethene

HPAL Hunters Point ambient level (for soil)

mg/kg Milligram per kilogram

NA Not applicable

NA1 Not applicable; chemical detected in all samples

PCB Polychlorinated biphenyl

PEST Pesticide

PQL Practical quantitation limit

SVOC Semivolatile organic compound

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.4-2: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 41 SOIL DATA (DEEPER THAN 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected Conc. to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected Conc. to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
PCB	Aroclor-1260 ^a	186	13	7.0	NA	0.211	34.12	1.00	7.17	7.2	NA	61.5	30.8	NA	43.9	1.2

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.
See Appendix C for full statistical analysis.

a Chemical not selected for nature and extent evaluation because residential criteria were exceeded by close to one order of magnitude and industrial criteria were exceeded in only two samples.

bgs Below ground surface
Conc. Concentration
HPAL Hunters Point ambient level (for soil)
mg/kg Milligram per kilogram
NA Not applicable
PCB Polychlorinated biphenyl
PQL Practical quantitation limit

TABLE 4.3.4-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 41 GROUNDWATER DATA, A-AQUIFER

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Maximum Detected Concentration (µg/L)	Detects Greater than HGAL (%)	Detects Greater than Vapor Intrusion Criteria (%)	Detects Greater than Surface Water Criteria (%)	Nondetect Greater than HGAL (%)	Nondetect Greater than Vapor Intrusion Criteria (%)	Nondetect Greater than Surface Water Criteria (%)
METAL	Aluminum	27	4	14.8	NA	NA	NA	108	NA	NA	NA	NA	NA	NA
METAL	Antimony	27	9	33.3	43.26	NA	NA	39.5	0.0	NA	NA	0.0	NA	NA
METAL	Arsenic	27	18	66.7	27.34	NA	36	4.7	0.0	NA	0.0	0.0	NA	0.0
METAL	Barium	27	27	100.0	504.2	NA	NA	408	0.0	NA	NA	NA1	NA1	NA1
METAL	Beryllium	27	4	14.8	1.4	NA	NA	0.54	0.0	NA	NA	17.4	NA	NA
METAL	Calcium	27	26	96.3	NA	NA	NA	722,000	NA	NA	NA	NA	NA	NA
METAL	Chromium	27	2	7.4	15.66	NA	50	16.2	50.0	NA	0.0	0.0	NA	0.0
METAL	Cobalt	27	5	18.5	20.8	NA	NA	11.1	0.0	NA	NA	0.0	NA	NA
METAL	Copper	27	7	25.9	28.04	NA	3.1	54.2	28.6	NA	71.4	0.0	NA	25.0
METAL	Iron	27	21	77.8	2380	NA	NA	1290	0.0	NA	NA	0.0	NA	NA
METAL	Lead	27	1	3.7	14.44	NA	5.6	4.2	0.0	NA	0.0	7.7	NA	38.5
METAL	Magnesium	27	26	96.3	1,440,000	NA	NA	1,050,000	0.0	NA	NA	0.0	NA	NA
METAL	Manganese	27	24	88.9	8,140	NA	NA	13,800	4.2	NA	NA	0.0	NA	NA
METAL	Mercury	47	5	10.6	0.6	NA	0.025	0.8	20.0	NA	100.0	0.0	NA	100.0
METAL	Molybdenum	19	6	31.6	61.9	NA	NA	30.6	0.0	NA	NA	0.0	NA	NA
METAL	Nickel	27	6	22.2	96.48	NA	8.2	41.4	0.0	NA	66.7	0.0	NA	66.7
METAL	Potassium	27	27	100.0	448,000	NA	NA	321,000	0.0	NA	NA	NA1	NA1	NA1
METAL	Selenium	26	1	3.9	14.5	NA	71	3.1	0.0	NA	0.0	68.0	NA	0.0
METAL	Sodium	27	27	100.0	9,242,000	NA	NA	9,800,000	3.7	NA	NA	NA1	NA1	NA1
METAL	Thallium	26	2	7.7	12.97	NA	426	14.1	50.0	NA	0.0	41.7	NA	0.0
METAL	Vanadium	27	7	25.9	26.62	NA	NA	9.2	0.0	NA	NA	15.0	NA	NA
METAL	Zinc	27	8	29.6	75.68	NA	81	26.4	0.0	NA	0.0	0.0	NA	0.0
VOC	1,2-Dichloroethene (total)	27	2	7.4	NA	210	44,800	0.4	NA	0.0	0.0	NA	0.0	0.0
VOC	Carbon Disulfide	18	2	11.1	NA	560	NA	9	NA	0.0	NA	NA	0.0	NA
VOC	Ethylbenzene	47	1	2.1	NA	3,100	86	1	NA	0.0	0.0	NA	0.0	0.0
VOC	Toluene	47	2	4.3	NA	1,400	5,000	3	NA	0.0	0.0	NA	0.0	0.0
VOC	Xylene (total)	47	3	6.4	NA	340	NA	8	NA	0.0	NA	NA	0.0	NA
SVOC	4-Nitrophenol	33	1	3.0	NA	NA	970	20	NA	NA	0.0	NA	NA	0.0
SVOC	Benzo(a)pyrene	47	1	2.1	NA	NA	60	0.1	NA	NA	0.0	NA	NA	0.0
SVOC	Benzo(b)fluoranthene	47	2	4.3	NA	NA	60	0.07	NA	NA	0.0	NA	NA	0.0
SVOC	Benzo(g,h,i)perylene	47	1	2.1	NA	NA	60	0.1	NA	NA	0.0	NA	NA	0.0
SVOC	Benzo(k)fluoranthene	47	1	2.1	NA	NA	60	0.03	NA	NA	0.0	NA	NA	0.0
SVOC	Total HMW PAH	47	2	4.3	NA	NA	NA	1.58	NA	NA	NA	NA	NA	NA
SVOC	Total PAH	47	2	4.3	NA	NA	NA	22.67	NA	NA	NA	NA	NA	NA
DIOXIN	Dibenzofuran	8	2	25.0	NA	13,000	NA	0.066	NA	0.0	NA	NA	0.0	NA
PCB	Aroclor-1260	51	2	3.9	NA	NA	0.03	4	NA	NA	100.0	NA	NA	100.0
PCB	Total Aroclor	51	2	3.9	NA	NA	NA	14	NA	NA	NA	NA	NA	NA
TPHEXT	Diesel-Range Organics	23	2	8.7	NA	NA	20,000	67	NA	NA	0.0	NA	NA	0.0
TPHEXT	Motor Oil-Range Organics	7	7	100.0	NA	NA	20,000	970	NA	NA	0.0	NA1	NA1	NA1
TPHPRG	Gasoline-Range Organics	13	2	15.4	NA	NA	20,000	36	NA	NA	0.0	NA	NA	0.0
TRPH	TRPH	8	1	12.5	NA	NA	NA	1000	NA	NA	NA	NA	NA	NA

TABLE 4.3.4-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 41 GROUNDWATER DATA, A-AQUIFER (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Notes: Data presented for all analytes detected in at least one sample.

Bolded values indicates criterion exceeded. **Bolded and shaded** chemicals indicate the chemical was retained for evaluation of its spatial distribution in groundwater.

See Appendix D for full statistical analysis.

Total TPH groundwater criteria are based on distance from the shoreline and are listed in Table 4-1. All wells in Redevelopment Block 41 are located more than 250 feet from the shoreline; therefore, the total TPH groundwater criterion for Redevelopment Block 41 is 20,000 µg/L.

µg/L	Microgram per liter
HGAL	Hunters Point groundwater ambient level
NA	Not applicable
NA1	Not applicable; chemical detected in all samples
PCB	Polychlorinated biphenyl
TPH	Total petroleum hydrocarbons
TPHEXT	Total petroleum hydrocarbons - extractable
TPHPRG	Total petroleum hydrocarbons - purgeable
TRPH	Total recoverable petroleum hydrocarbons
SVOC	Semivolatile organic compound
VOC	Volatile organic compound

TABLE 4.3.5-1: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 43 SOIL DATA (0 TO 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected Conc. to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected Conc. to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Antimony	332	111	33.4	9.05	10.2	1.56	818	0.02	15.9	9.0	6.3	0.0	0.9	0.5	0.0
METAL	Arsenic	413	311	75.3	11.1	0.038	6,373.55	0.43	562.62	244	8.7	100.0	98.7	0.0	100.0	64.7
METAL	Cadmium	413	124	30.0	3.14	3.46	2.37	983	0.01	8.2	5.7	4.8	0.0	0.0	0.0	0.0
METAL	Copper	413	390	94.4	124.3	159	40.97	75,628	0.09	6,520	11.8	8.2	0.0	0.0	0.0	0.0
METAL	Iron	413	413	100.0	NA	21,963	5.55	613,200	0.20	122,000	NA	92.0	0.0	NA1	NA1	NA1
METAL	Lead	529	441	83.4	8.99	155	9.44	800	1.89	1,510	46.0	4.5	0.5	0.0	0.0	0.0
METAL	Manganese	413	413	100.0	1431.2	843	5.93	32,251	0.16	5,000	6.1	34.1	0.0	NA1	NA1	NA1
METAL	Mercury	408	224	54.9	2.28	1.59	125.69	611	0.33	200	6.3	8.5	0.0	0.5	0.5	0.0
METAL	Nickel ^a	413	413	100.0	26.2-5,804	302	8.28	20,692	0.12	2,500	0.0	58.8	0.0	NA1	NA1	NA1
METAL	Vanadium	413	412	99.8	117.2	64.8	3.52	2,044	0.11	228	2.4	30.6	0.0	0.0	0.0	0.0
METAL	Zinc ^b	413	394	95.4	109.9	373	15.30	613,200	0.01	5,710	17.3	4.8	0.0	0.0	0.0	0.0
PCB	Aroclor-1254	424	2	0.5	NA	0.093	8.71	1.00	0.81	0.81	NA	100.0	0.0	NA	34.1	1.2
PCB	Aroclor-1260	424	67	15.8	NA	0.21	75.81	1.00	15.93	16	NA	44.8	19.4	NA	4.5	0.3
PEST	alpha-BHC	410	2	0.5	NA	0.002	1.00	0.59	0.00	0.0019	NA	50.0	0.0	NA	95.3	0.0
PEST	Hepatachlor epoxide ^b	411	5	1.2	NA	0.001	14.85	0.27	0.03	0.008	NA	80.0	0.0	NA	94.8	0.0
SVOC	3,3'-Dichlorobenzidine ^{b,c}	408	1	0.3	NA	0.008	16.19	2.06	0.06	0.13	NA	100.0	0.0	NA	100.0	6.4
SVOC	4-Nitrophenol	410	2	0.5	NA	0.288	4.17	440	0.00	1.2	NA	50.0	0.0	NA	100.0	0.0
SVOC	Benzo(a)anthracene	571	71	12.4	NA	0.37	22.17	1.76	4.67	8.2	NA	26.8	7.0	NA	40.6	5.4
SVOC	Benzo(a)pyrene	568	79	13.9	NA	0.037	171.54	0.18	36.45	6.4	NA	97.5	48.1	NA	99.8	77.7
SVOC	Benzo(b)fluoranthene	568	110	19.4	NA	0.338	38.42	1.76	7.40	13	NA	29.1	8.2	NA	62.7	5.7
SVOC	Benzo(k)fluoranthene	568	37	6.5	NA	0.338	12.12	1.76	2.33	4.1	NA	27.0	8.1	NA	57.4	5.3
SVOC	Bis(2-ethylhexyl)phthalate	409	2	0.5	NA	1.14	3.24	176	0.02	3.7	NA	100.0	0.0	NA	8.1	0.0
SVOC	Carbazole	297	4	1.4	NA	2.24	1.56	123	0.03	3.5	NA	25.0	0.0	NA	4.4	0.0
SVOC	Chrysene	571	118	20.7	NA	3.30	2.69	17.56	0.51	8.9	NA	3.4	0.0	NA	4.4	0.4
SVOC	Dibenz(a,h)anthracene ^{b,c}	566	9	1.6	NA	0.058	19.00	0.29	3.81	1.1	NA	77.8	11.1	NA	89.1	57.5
SVOC	Indeno(1,2,3-cd)pyrene	567	43	7.6	NA	0.35	3.17	1.76	0.63	1.1	NA	23.3	0.0	NA	56.5	5.5
SVOC	n-Nitroso-di-n-propylamine ^b	412	1	0.2	NA	0.0002	1,155.77	0.35	0.57	0.2	NA	100.0	0.0	NA	100.0	84.7
VOC	Benzene	485	16	3.3	NA	0.18	106.33	0.39	48.90	19	NA	25.0	25.0	NA	1.7	1.3
VOC	Naphthalene	585	60	10.3	NA	1.67	25.22	4.65	9.02	42	NA	13.3	6.7	NA	5.1	1.3

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.

See Appendix C for full statistical analysis.

a The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

b Chemical not selected for nature and extent evaluation based on the percent of detections and the low number of detections that exceeded criteria.

c Chemical not selected for nature and extent evaluation because the residential criterion was exceeded by close to one order of magnitude.

bgs	Below ground surface	NA1	Not applicable; chemical detected in all samples
BHC	Benzene hexachloride	PCB	Polychlorinated biphenyl
Conc.	Concentration	PEST	Pesticide
HPAL	Hunters Point ambient level (for soil)	PQL	Practical quantitation limit
mg/kg	Milligram per kilogram	SVOC	Semivolatile organic compound
NA	Not applicable	VOC	Volatile organic compound

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.5-2: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 43 SOIL DATA (DEEPER THAN 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected Conc. to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected Conc. to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Antimony	271	95	35.1	9.05	10.2	1.07	818	0.01	10.9	5.3	1.1	0.0	2.3	0.6	0.0
METAL	Arsenic ^a	289	233	80.6	11.1	0.038	6,033.98	0.434	532.65	231	10.7	100.0	99.1	0.0	100.0	39.3
METAL	Cadmium	289	164	56.8	3.14	3.46	3.50	983	0.01	12.1	0.6	0.6	0.0	0.0	0.0	0.0
METAL	Copper	289	279	96.5	124.3	159	24.19	75,628	0.05	3,850	4.3	2.9	0.0	0.0	0.0	0.0
METAL	Iron	289	289	100.0	NA	21,963	3.01	613,200	0.11	66,200	NA	86.9	0.0	NA1	NA1	NA1
METAL	Lead	321	279	86.9	8.99	155	3.03	800	0.61	484	38.0	2.5	0.0	9.5	0.0	0.0
METAL	Manganese	289	289	100.0	1431.2	843	5.23	32,251	0.14	4,410	2.4	15.6	0.0	NA1	NA1	NA1
METAL	Mercury ^a	288	115	39.9	2.28	1.59	206.76	611	0.54	329	9.6	11.3	0.0	0.0	0.6	0.0
METAL	Nickel ^b	289	289	100.0	52.2-5663	302	6.82	20,692	0.10	2,060	0.0	39.8	0.0	NA1	NA1	NA1
METAL	Vanadium	289	289	100.0	117.2	64.8	3.12	2,044	0.10	202	2.1	31.1	0.0	NA1	NA1	NA1
METAL	Zinc	289	285	98.6	109.9	373	6.86	613,200	0.00	2,560	4.9	2.5	0.0	0.0	0.0	0.0
PCB	Aroclor-1254	249	2	0.8	NA	0.093	3.12	1.00	0.29	0.29	NA	50.0	0.0	NA	14.6	0.8
PEST	Aldrin	250	2	0.8	NA	0.024	1.20	0.145	0.20	0.029	NA	50.0	0.0	NA	1.2	0.0
PEST	alpha-BHC ^c	250	2	0.8	NA	0.002	13.74	0.594	0.04	0.026	NA	100.0	0.0	NA	100.0	0.0
PEST	gamma-BHC (Lindane)	250	1	0.4	NA	0.003	4.16	2.88	0.00	0.011	NA	100.0	0.0	NA	32.5	0.0
PEST	Heptachlor epoxide ^c	250	1	0.4	NA	0.001	27.85	0.271	0.06	0.015	NA	100.0	0.0	NA	92.4	0.0
SVOC	2-Methylnaphthalene	287	42	14.6	NA	145	2.21	798	0.40	320	NA	2.4	0.0	NA	0.0	0.0
SVOC	Benzo(a)anthracene	318	30	9.4	NA	0.370	21.63	1.76	4.56	8	NA	20.0	6.7	NA	86.1	3.1
SVOC	Benzo(a)pyrene	318	38	12.0	NA	0.037	195.67	0.176	41.57	7.3	NA	86.8	36.8	NA	100.0	93.9
SVOC	Benzo(b)fluoranthene	318	34	10.7	NA	0.338	22.17	1.76	4.27	7.5	NA	35.3	2.9	NA	93.0	4.2
SVOC	Benzo(k)fluoranthene	318	25	7.9	NA	0.338	19.80	1.76	3.82	6.7	NA	16.0	4.0	NA	92.2	4.8
SVOC	Chrysene	318	46	14.5	NA	3.30	4.84	17.6	0.91	16	NA	4.4	0.0	NA	2.9	0.7
SVOC	Dibenz(a,h)anthracene ^d	317	7	2.2	NA	0.058	25.90	0.289	5.20	1.5	NA	71.4	14.3	NA	99.4	91.3
SVOC	Indeno(1,2,3-cd)pyrene ^c	317	22	6.9	NA	0.347	9.21	1.76	1.82	3.2	NA	18.2	4.6	NA	90.9	4.8
VOC	Benzene	334	11	3.3	NA	0.179	1.01	0.389	0.46	0.18	NA	9.1	0.0	NA	1.9	1.9
VOC	Naphthalene	319	40	12.5	NA	1.67	102.08	4.65	36.53	170	NA	22.5	15.0	NA	1.8	1.4

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.

See Appendix C for full statistical analysis.

a Metal selection is based on samples from 0 to 10 feet bgs.

b The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

c Chemical not selected for nature and extent evaluation based on the percent of detections and the low number of detections that exceeded criteria.

d Chemical not selected for nature and extent evaluation based on PQL factor.

bgs	Below ground surface	NA1	Not applicable; chemical detected in all samples
BHC	Benzene hexachloride	PCB	Polychlorinated biphenyl
Conc.	Concentration	PEST	Pesticide
HPAL	Hunters Point ambient level (for soil)	PQL	Practical quantitation limit
mg/kg	Milligram per kilogram	SVOC	Semivolatile organic compound
NA	Not applicable	VOC	Volatile organic compound

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.5-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 43 GROUNDWATER DATA, A-AQUIFER

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Maximum Detected Concentration (µg/L)	Detects Greater than HGAL (%)	Detects Greater than Vapor Intrusion Criteria (%)	Detects Greater than Surface Water Criteria (%)	Nondetect Greater than HGAL (%)	Nondetect Greater than Vapor Intrusion Criteria (%)	Nondetect Greater than Surface Water Criteria (%)
METAL	Aluminum	90	14	15.6	NA	NA	NA	4,160	NA	NA	NA	NA	NA	NA
METAL	Antimony	90	14	15.6	43.26	NA	NA	37.2	0.0	NA	NA	0.0	NA	NA
METAL	Arsenic	91	36	39.6	27.34	NA	36	148	8.3	NA	5.6	5.5	NA	0.0
METAL	Barium	92	90	97.8	504.2	NA	NA	4,770	8.9	NA	NA	0.0	NA	NA
METAL	Beryllium	87	1	1.2	1.4	NA	NA	0.98	0.0	NA	NA	1.2	NA	NA
METAL	Cadmium	91	9	9.9	5.08	NA	8.8	7.2	11.1	NA	0.0	0.0	NA	0.0
METAL	Calcium	92	88	95.7	NA	NA	NA	451,000	NA	NA	NA	NA	NA	NA
METAL	Chromium	87	6	6.9	15.66	NA	50	25.7	16.7	NA	0.0	0.0	NA	0.0
METAL	Cobalt	87	41	47.1	20.8	NA	NA	24.6	2.4	NA	NA	0.0	NA	NA
METAL	Copper	93	23	24.7	28.04	NA	3.1	366	26.1	NA	69.6	0.0	NA	22.9
METAL	Iron	92	29	31.5	2,380	NA	NA	9,840	20.7	NA	NA	0.0	NA	NA
METAL	Lead	90	9	10.0	14.44	NA	5.6	31.4	11.1	NA	33.3	0.0	NA	6.2
METAL	Magnesium	92	91	98.9	1,440,000	NA	NA	1,400,000	0.0	NA	NA	0.0	NA	NA
METAL	Manganese	87	86	98.9	8140	NA	NA	6,640	0.0	NA	NA	0.0	NA	NA
METAL	Mercury	93	7	7.5	0.6	NA	0.025	11	57.1	NA	100.0	0.0	NA	100.0
METAL	Molybdenum	87	44	50.6	61.9	NA	NA	57.7	0.0	NA	NA	0.0	NA	NA
METAL	Nickel	88	50	56.8	96.48	NA	8.2	92.2	0.0	NA	74.0	0.0	NA	44.7
METAL	Potassium	92	91	98.9	448,000	NA	NA	368,000	0.0	NA	NA	0.0	NA	NA
METAL	Selenium	83	9	10.8	14.5	NA	71	3.1	0.0	NA	0.0	10.8	NA	0.0
METAL	Silver	87	2	2.3	7.43	NA	0.38	3.1	0.0	NA	100.0	0.0	NA	100.0
METAL	Sodium	92	92	100.0	9,242,000	NA	NA	6,650,000	0.0	NA	NA	NA1	NA1	NA1
METAL	Thallium	79	7	8.9	12.97	NA	426	11.8	0.0	NA	0.0	8.3	NA	0.0
METAL	Vanadium	87	46	52.9	26.62	NA	NA	12.8	0.0	NA	NA	0.0	NA	NA
METAL	Zinc	89	12	13.5	75.68	NA	81	1,340	41.7	NA	41.7	0.0	NA	0.0
VOC	1,1,2-Trichloroethane	125	1	0.8	NA	4	NA	0.5	NA	0.0	NA	NA	30.7	NA
VOC	1,1-Dichloroethane	126	1	0.8	NA	6.5	NA	4	NA	0.0	NA	NA	12.0	NA
VOC	1,2,4-Trichlorobenzene	126	1	0.8	NA	66	129	0.8	NA	0.0	0.0	NA	2.4	0.0
VOC	1,2-Dichlorobenzene	126	7	5.6	NA	2,600	129	0.55	NA	0.0	0.0	NA	0.0	0.0
VOC	1,2-Dichloroethane	126	1	0.8	NA	2.3	22,600	0.37	NA	0.0	0.0	NA	30.4	0.0
VOC	1,2-Dichloroethene (total)	84	10	11.9	NA	210	44,800	10	NA	0.0	0.0	NA	0.0	0.0
VOC	1,2-Dichloropropane	125	1	0.8	NA	1.1	3,040	0.4	NA	0.0	0.0	NA	30.7	0.0
VOC	1,4-Dichlorobenzene	126	4	3.2	NA	2.1	129	0.93	NA	0.0	0.0	NA	68.9	0.0
VOC	Benzene	128	15	11.7	NA	0.37	700	1,500	NA	80.0	6.7	NA	100.0	0.0
VOC	Bromodichloromethane	125	2	1.6	NA	1	6,400	4	NA	100.0	0.0	NA	30.9	0.0
VOC	Carbon Disulfide	107	7	6.5	NA	560	NA	2	NA	0.0	NA	NA	0.0	NA
VOC	Carbon Tetrachloride	125	3	1.6	NA	0.046	6,400	0.48	NA	100.0	0.0	NA	100.0	0.0
VOC	Chlorobenzene	125	1	0.8	NA	390	129	1	NA	0.0	0.0	NA	0.0	0.0
VOC	Chloroform	126	4	3.2	NA	0.7	6,400	54	NA	75.0	0.0	NA	36.9	0.0
VOC	Chloromethane	126	1	0.8	NA	92	6,400	3	NA	0.0	0.0	NA	0.8	0.0
VOC	cis-1,2-Dichloroethene	42	5	11.9	NA	210	44,800	1	NA	0.0	0.0	NA	0.0	0.0
VOC	Cyclohexane	16	5	31.3	NA	730	NA	5.6	NA	0.0	NA	NA	0.0	NA
VOC	Ethylbenzene	128	13	10.2	NA	3,100	86	550	NA	0.0	7.7	NA	0.0	0.0
VOC	Isopropylbenzene	16	5	31.3	NA	7.8	NA	1	NA	0.0	NA	NA	0.0	NA

TABLE 4.3.5-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 43 GROUNDWATER DATA, A-AQUIFER (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Maximum Detected Concentration (µg/L)	Detects Greater than HGAL (%)	Detects Greater than Vapor Intrusion Criteria (%)	Detects Greater than Surface Water Criteria (%)	Nondetect Greater than HGAL (%)	Nondetect Greater than Vapor Intrusion Criteria (%)	Nondetect Greater than Surface Water Criteria (%)
VOC	Methylcyclohexane	16	3	18.8	NA	170	NA	1.7	NA	0.0	NA	NA	0.0	NA
VOC	Naphthalene	105	8	7.6	NA	3.6	470	220	NA	87.5	0.0	NA	96.9	0.0
VOC	Tert-Butyl Methyl Ether	43	5	11.6	NA	390	8,000	6	NA	0.0	0.0	NA	0.0	0.0
VOC	Tetrachloroethene	125	2	1.6	NA	0.54	450	2	NA	50.0	0.0	NA	35.8	0.0
VOC	Toluene	128	9	7.0	NA	1,400	5,000	60	NA	0.0	0.0	NA	0.0	0.0
VOC	trans-1,2-Dichloroethene	42	1	2.4	NA	180	44,800	0.21	NA	0.0	0.0	NA	0.0	0.0
VOC	Trichloroethene	125	10	8.0	NA	2.9	400	210	NA	30.0	0.0	NA	31.3	0.0
VOC	m,p-Xylenes	18	2	11.1	NA	NA	NA	0.52	NA	NA	NA	NA	NA	NA
VOC	o-Xylene	18	4	22.2	NA	340	NA	0.28	NA	0.0	NA	NA	0.0	NA
VOC	Xylene (total)	110	11	10.0	NA	340	NA	1,300	NA	9.1	NA	NA	0.0	NA
SVOC	2,2'-Oxybis(1-Chloropropane)	105	1	1.0	NA	53	NA	41	NA	0.0	NA	NA	2.9	NA
SVOC	2,4-Dimethylphenol	100	3	3.0	NA	NA	NA	45	NA	NA	NA	NA	NA	NA
SVOC	2-Methylnaphthalene	105	10	9.5	NA	710	NA	78	NA	0.0	NA	NA	0.0	NA
SVOC	4-Methylphenol	100	1	1.0	NA	NA	NA	2	NA	NA	NA	NA	NA	NA
SVOC	Acenaphthene	105	10	9.5	NA	33,000	710	42	NA	0.0	0.0	NA	0.0	0.0
SVOC	Anthracene	105	2	1.9	NA	390,000	60	5	NA	0.0	0.0	NA	0.0	2.9
SVOC	Benzo(a)Anthracene	105	1	1.0	NA	NA	60	2	NA	NA	0.0	NA	NA	2.9
SVOC	Benzo(g,h,i)Perylene	105	2	1.9	NA	NA	60	0.9	NA	NA	0.0	NA	NA	2.9
SVOC	Chrysene	105	1	1.0	NA	NA	60	0.1	NA	NA	0.0	NA	NA	2.9
SVOC	Dibenzofuran	105	4	3.8	NA	13,000	NA	24	NA	0.0	NA	NA	0.0	NA
SVOC	Fluoranthene	105	6	5.7	NA	NA	16	15	NA	NA	0.0	NA	NA	5.1
SVOC	Fluorene	105	5	4.8	NA	44,000	60	20	NA	0.0	0.0	NA	0.0	3.0
SVOC	N-Nitrosodiphenylamine	105	1	1.0	NA	NA	660,000	5	NA	NA	0.0	NA	NA	0.0
SVOC	Pentachlorophenol	100	1	1.0	NA	NA	7.9	25	NA	NA	100.0	NA	NA	79.8
SVOC	Phenanthrene	105	6	5.7	NA	190,000	60	52	NA	0.0	0.0	NA	0.0	2.0
SVOC	Phenol	100	1	1.0	NA	NA	1,160	1.4	NA	NA	0.0	NA	NA	0.0
SVOC	Pyrene	105	7	6.7	NA	230,000	60	11	NA	0.0	0.0	NA	0.0	2.0
PEST	4,4'-DDD	99	1	1.0	NA	NA	0.72	0.003	NA	NA	0.0	NA	NA	1.0
PEST	4,4'-DDE	99	1	1.0	NA	NA	2.8	0.002	NA	NA	0.0	NA	NA	0.0
PEST	4,4'-DDT	99	3	3.0	NA	NA	0.001	0.064	NA	NA	100.0	NA	NA	100.0
PEST	Aldrin	99	1	1.0	NA	NA	0.26	0.015	NA	NA	0.0	NA	NA	3.1
PEST	alpha-Chlordane	99	4	4.0	NA	NA	0.004	0.03	NA	NA	50.0	NA	NA	100.0
PEST	delta-BHC	99	1	1.0	NA	NA	NA	0.022	NA	NA	NA	NA	NA	NA
PEST	Dieldrin	99	2	2.0	NA	NA	0.142	0.053	NA	NA	0.0	NA	NA	3.1
PEST	Endosulfan I	99	1	1.0	NA	NA	0.0087	0.0095	NA	NA	100.0	NA	NA	95.9
PEST	Endrin	99	1	1.0	NA	NA	0.0023	0.019	NA	NA	100.0	NA	NA	100.0
PEST	gamma-Chlordane	99	1	1.0	NA	NA	0.004	0.02	NA	NA	100.0	NA	NA	100.0
PEST	Heptachlor	99	2	2.0	NA	NA	0.0036	0.1	NA	NA	100.0	NA	NA	100.0
PEST	Heptachlor Epoxide	90	1	1.1	NA	NA	0.0036	0.02	NA	NA	100.0	NA	NA	100.0
PCB	Aroclor-1260	94	2	2.1	NA	NA	0.03	0.8	NA	NA	100.0	NA	NA	100.0
TPHEXT	Diesel-Range Organics	94	43	45.7	NA	NA	20,000	11,000	NA	NA	0.0	NA	NA	0.0
TPHEXT	Motor Oil-Range Organics	68	52	76.5	NA	NA	20,000	21,000	NA	NA	1.5	NA	NA	0.0
TPHEXT	TPH-Extractable Unknown Hydrocarbon	16	3	18.8	NA	NA	NA	1,000	NA	NA	NA	NA	NA	NA

TABLE 4.3.5-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 43 GROUNDWATER DATA, A-AQUIFER (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/ Analyses (%)	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Maximum Detected Concentration (µg/L)	Detects Greater than HGAL (%)	Detects Greater than Vapor Intrusion Criteria (%)	Detects Greater than Surface Water Criteria (%)	Nondetect Greater than HGAL (%)	Nondetect Greater than Vapor Intrusion Criteria (%)	Nondetect Greater than Surface Water Criteria (%)
TPHPRG	Gasoline-Range Organics	95	23	24.2	NA	NA	20,000	9,000	NA	NA	0.0	NA	NA	0.0
TPHPRG	TPH-Purgeable Unknown Hydrocarbon	16	3	18.8	NA	NA	NA	1,000	NA	NA	NA	NA	NA	NA
TRPH	TRPH	57	19	33.3	NA	NA	NA	24,000	NA	NA	NA	NA	NA	NA

Notes: Data presented for all analytes detected in at least one sample.

See Appendix D for full statistical analysis.

Bolded values indicates criterion exceeded. **Bolded and shaded** chemicals indicate the chemical was retained for evaluation of its spatial distribution in groundwater.

Total TPH groundwater criteria are based on distance from the shoreline and are listed in Table 4-1. All wells in Redevelopment Block 43 are located more than 250 feet from the shoreline; therefore, the total TPH groundwater criterion for Redevelopment Block 43 is 20,000 µg/L.

µg/L	Microgram per liter
BHC	Benzene hexachloride
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethene
DDT	Dichlorodiphenyltrichloroethane
HGAL	Hunters Point groundwater ambient level
NA	Not applicable
NA1	Not applicable; chemical detected in all samples
PCB	Polychlorinated biphenyl
PEST	Pesticide
SVOC	Semivolatile organic compound
TPH	Total petroleum hydrocarbons
TPHEXT	Total petroleum hydrocarbons - extractable
TPHPRG	Total petroleum hydrocarbons - purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compound

TABLE 4.3.6-1: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 44 SOIL DATA (0 TO 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detected (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Antimony	191	53	27.8	9.05	10.2	2.94	818	0.04	30	26.4	22.6	0.0	4.4	4.4	0.0
METAL	Arsenic	252	183	72.6	11.1	0.038	1.121	0.434	98.92	42.9	9.8	100.0	99.5	0.0	100.0	97.1
METAL	Cadmium	252	63	25.0	3.14	3.46	1.85	983	0.01	6.4	12.7	12.7	0.0	0.0	0.0	0.0
METAL	Copper	252	247	98.0	124.3	159	49.76	75,628	0.10	7,920	22.7	21.9	0.0	0.0	0.0	0.0
METAL	Iron	252	252	100.0	NA	21,963	5.01	613,200	0.18	110,000	NA	83.7	0.0	NA1	NA1	NA1
METAL	Lead	252	221	87.7	8.99	155	41.06	800	8.21	6,570	78.7	15.4	1.8	3.2	0.0	0.0
METAL	Manganese	252	252	100.0	1431.2	843	7.28	32,251	0.19	6,140	6.4	24.2	0.0	NA1	NA1	NA1
METAL	Mercury ^a	250	186	74.4	2.28	1.59	13.20	611	0.03	21	6.5	8.1	0.0	0.0	0.0	0.0
METAL	Nickel ^b	252	252	100.0	15.5-6,425	302	7.81	20,692	0.11	2,360	0.8	47.2	0.0	NA1	NA1	NA1
METAL	Thallium	239	17	7.1	0.81	5.02	1.11	135	0.04	5.6	82.4	29.4	0.0	11.3	1.8	0.0
METAL	Vanadium ^d	252	252	100.0	117.2	64.8	55.06	2,044	1.75	3,570	7.5	34.9	0.4	NA1	NA1	NA1
METAL	Zinc ^a	252	252	100.0	109.9	373	16.88	613,200	0.01	6,300	41.3	17.9	0.0	NA1	NA1	NA1
VOC	1,2,4-Trimethylbenzene ^c	6	3	50.0	NA	51.6	27.13	171	8.21	1,400	NA	66.7	66.7	NA	0.0	0.0
VOC	1,3,5-Trimethylbenzene ^c	6	3	50.0	NA	21.3	13.64	69.8	4.16	290	NA	66.7	66.7	NA	0.0	0.0
VOC	1,4-Dichlorobenzene	254	6	2.4	NA	2.01	1.74	4.54	0.77	3.5	NA	50.0	0.0	NA	10.1	5.7
VOC	Naphthalene	267	43	16.1	NA	1.67	126.10	4.65	45.12	210	NA	18.6	14.0	NA	10.7	4.9
VOC	o-Xylene	23	7	30.4	NA	272	1.07	902	0.32	290	NA	14.3	0.0	NA	0.0	0.0
SVOC	4-Nitrophenol	247	3	1.2	NA	0.288	4.52	440	0.00	1.3	NA	33.3	0.0	NA	100.0	0.0
SVOC	Benzo(a)anthracene ^c	261	73	28.0	NA	0.370	6.22	1.76	1.31	2.3	NA	31.5	2.7	NA	55.3	11.7
SVOC	Benzo(a)pyrene	259	71	27.4	NA	0.037	96.49	0.18	20.50	3.6	NA	94.4	43.7	NA	100.0	89.4
SVOC	Benzo(b)fluoranthene ^d	260	95	36.5	NA	0.338	18.92	1.76	3.64	6.4	NA	31.6	7.4	NA	70.9	12.7
SVOC	Benzo(k)fluoranthene	258	20	7.8	NA	0.338	2.60	1.76	0.50	0.88	NA	30.0	0.0	NA	67.2	10.9
SVOC	Bis(2-ethylhexyl)phthalate ^c	248	3	1.2	NA	1.14	96.35	176	0.62	110	NA	100.0	0.0	NA	15.5	0.0
SVOC	Chrysene	261	108	41.4	NA	3.30	1.18	17.6	0.22	3.9	NA	2.8	0.0	NA	9.2	3.3
SVOC	Dibenz(a,h)anthracene ^e	258	17	6.6	NA	0.058	13.99	0.289	2.81	0.81	NA	82.4	17.7	NA	100.0	67.6
SVOC	Indeno(1,2,3-cd)pyrene ^c	258	48	18.6	NA	0.347	6.62	1.76	1.31	2.3	NA	27.1	4.2	NA	67.6	11.9
PEST	4,4'-DDD	250	23	9.2	NA	2.14	2.76	17.1	0.35	5.9	NA	4.4	0.0	NA	0.4	0.0
PEST	Aldrin ^c	250	2	0.8	NA	0.024	8.71	0.15	1.45	0.21	NA	100.0	50.0	NA	10.1	2.0
PEST	beta-BHC	250	2	0.8	NA	0.007	1.10	2.08	0.00	0.007	NA	50.0	0.0	NA	66.1	0.4
PEST	Dieldrin	250	2	0.8	NA	0.001	4.40	0.15	0.02	0.003	NA	100.0	0.0	NA	98.8	7.3
PEST	gamma-BHC (lindane)	250	2	0.8	NA	0.003	3.02	2.88	0.00	0.008	NA	100.0	0.0	NA	71.0	0.0
PCB	Aroclor-1248 ^c	257	1	0.4	NA	0.201	35.37	1.00	7.07	7.1	NA	100.0	100.0	NA	12.5	2.3
PCB	Aroclor-1254 ^d	257	10	3.9	NA	0.093	354.93	1.00	32.85	33	NA	90.0	40.0	NA	60.3	5.7
PCB	Aroclor-1260	257	77	30.0	NA	0.211	47.38	1.00	9.95	10	NA	39.0	10.4	NA	17.8	6.1
DIOXIN	1,2,3,4,6,7,8-HPCDD	15	9	60.0	NA	0.0004	2.50	0.003	0.33	0.001	NA	44.4	0.0	NA	83.3	0.0
DIOXIN	2,3,7,8-TCDD	15	4	26.7	NA	0.000004	4.44	0.000027	0.59	0.000016	NA	100.0	0.0	NA	100.0	100.0

TABLE 4.3.6-1: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 44 SOIL DATA (0 TO 10 FEET BGS) (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.

See Appendix C for full statistical analysis.

- a Chemical not selected for nature and extent evaluation based on maximum detection factor (maximum detect less than 30 times residential criteria).
- b The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.
- c Chemical not selected for nature and extent evaluation based on the percent of detections and the low number of detections that exceeded criteria.
- d Chemical not selected for nature and extent evaluation based on collocation with selected chemical.
- e Chemical not selected for nature and extent evaluation because of PQL factor.

bgs	Below ground surface
BHC	Benzene hexachloride
Conc.	Concentration
DDD	Dichlorodiphenyldichloroethane
HPAL	Hunters Point ambient level (for soil)
HPCDD	Heptachlorodibenzo-p-dioxin
mg/kg	Milligram per kilogram
NA	Not applicable
NA1	Not applicable; chemical detected in all samples
PCB	Polychlorinated biphenyl
PEST	Pesticide
PQL	Practical quantitation limit
SVOC	Semivolatile organic compound
TCDD	Tetrachlorodibenzo-p-dioxin
VOC	Volatile organic compound

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.6-2: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 44 SOIL DATA (DEEPER THAN 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Antimony ^a	65	19	29.2	9.05	10.2	2.30	818	0.03	23.5	10.5	10.5	0.0	2.2	2.2	0.0
METAL	Arsenic ^a	108	89	82.4	11.1	0.038	669	0.434	59.03	25.6	7.9	100.0	98.9	0.0	100.0	57.9
METAL	Copper ^a	108	95	88.0	124.3	159	1.89	75,628	0.00	301	4.2	3.2	0.0	0.0	0.0	0.0
METAL	Iron ^a	108	108	100.0	NA	21,963	4.24	613,200	0.15	93,200	NA	86.1	0.0	NA1	NA1	NA1
METAL	Lead ^a	108	88	81.5	8.99	155	9.94	800	1.99	1,590	34.1	1.1	1.1	5.0	0.0	0.0
METAL	Manganese ^a	108	108	100.0	1431.2	843	16.01	32,251	0.42	13,500	4.6	22.2	0.0	NA1	NA1	NA1
METAL	Nickel ^{a,b}	108	108	100.0	56.1-5,542	302	6.92	20,692	0.10	2,090	0.0	50.9	0.0	NA1	NA1	NA1
METAL	Vanadium ^a	108	107	99.1	117.2	64.8	2.39	2,044	0.08	155	4.7	38.3	0.0	0.0	0.0	0.0
SVOC	Benzo(a)pyrene	114	9	7.9	NA	0.037	12.60	0.176	2.68	0.47	NA	100.0	11.1	NA	100.0	100.0
PCB	Aroclor-1260	107	5	4.7	NA	0.211	5.21	1.00	1.09	1.1	NA	40.0	20.0	NA	19.6	0.0

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.

See Appendix C for full statistical analysis.

a Metal selection is based on samples from 0 to 10 feet bgs.

b The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

bgs Below ground surface

Conc. Concentration

HPAL Hunters Point ambient level (for soil)

mg/kg Milligram per kilogram

NA Not applicable

NA1 Not applicable; chemical detected in all samples

PCB Polychlorinated biphenyl

PQL Practical quantitation limit

SVOC Semivolatile organic compound

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.6-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 44 GROUNDWATER DATA, A-AQUIFER

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Maximum Detected Concentration (µg/L)	Detections Greater than HGAL (%)	Detections Greater than Vapor Intrusion Criteria (%)	Detections Greater than Surface Water Criteria (%)	Nondetections Greater than HGAL (%)	Nondetections Greater than Vapor Intrusion Criteria (%)	Nondetections Greater than Surface Water Criteria (%)
METAL	Aluminum	71	13	18.3	NA	NA	NA	16,200	NA	NA	NA	NA	NA	NA
METAL	Antimony	58	5	8.6	43.26	NA	NA	35.7	0.0	NA	NA	1.9	NA	NA
METAL	Arsenic	66	37	56.1	27.34	NA	36	62.8	8.1	NA	5.4	0.0	NA	0.0
METAL	Barium	69	69	100.0	504.2	NA	NA	2,980	15.9	NA	NA	NA1	NA1	NA1
METAL	Beryllium	59	1	1.7	1.4	NA	NA	0.31	0.0	NA	NA	1.7	NA	NA
METAL	Cadmium	80	18	22.5	5.08	NA	8.8	37.9	38.9	NA	22.2	1.6	NA	1.6
METAL	Calcium	71	71	100.0	NA	NA	NA	694,000	NA	NA	NA	NA1	NA1	NA1
METAL	Chromium	69	9	13.0	15.66	NA	50	148	44.4	NA	33.3	3.3	NA	1.7
METAL	Cobalt	59	15	25.4	20.8	NA	NA	24.8	13.3	NA	NA	2.3	NA	NA
METAL	Copper	67	25	37.3	28.04	NA	3.1	32.9	4.0	NA	80.0	0.0	NA	42.9
METAL	Iron	71	26	36.6	2,380	NA	NA	21,900	38.5	NA	NA	0.0	NA	NA
METAL	Lead	59	9	15.3	14.44	NA	5.6	10.8	0.0	NA	22.2	0.0	NA	8.0
METAL	Magnesium	71	71	100.0	1,440,000	NA	NA	903,000	0.0	NA	NA	NA1	NA1	NA1
METAL	Manganese	59	57	96.6	8,140	NA	NA	9,310	1.8	NA	NA	0.0	NA	NA
METAL	Molybdenum	57	31	54.4	61.9	NA	NA	249	12.9	NA	NA	0.0	NA	NA
METAL	Nickel	79	53	67.1	96.48	NA	8.2	267	20.8	NA	90.6	0.0	NA	57.7
METAL	Potassium	71	71	100.0	448,000	NA	NA	237,000	0.0	NA	NA	NA1	NA1	NA1
METAL	Selenium	55	6	10.9	14.5	NA	71	16.3	16.7	NA	0.0	8.2	NA	0.0
METAL	Silver	59	1	1.7	7.43	NA	0.38	0.44	0.0	NA	100.0	1.7	NA	100.0
METAL	Sodium	71	71	100.0	9,242,000	NA	NA	5,910,000	0.0	NA	NA	NA1	NA1	NA1
METAL	Thallium	46	2	4.4	12.97	NA	426	1.7	0.0	NA	0.0	13.6	NA	0.0
METAL	Vanadium	59	26	44.1	26.62	NA	NA	39.8	11.5	NA	NA	0.0	NA	NA
METAL	Zinc	59	8	13.6	75.68	NA	81	58.3	0.0	NA	0.0	0.0	NA	0.0
VOC	1,1,1-Trichloroethane	83	7	8.4	NA	3,100	6,240	12	NA	0.0	0.0	NA	0.0	0.0
VOC	1,1-Dichloroethane	83	21	25.3	NA	6.5	NA	28.13	NA	33.3	NA	NA	6.5	NA
VOC	1,1-Dichloroethene	83	5	6.0	NA	190	44,800	2	NA	0.0	0.0	NA	0.0	0.0
VOC	1,2-Dichlorobenzene	83	7	8.4	NA	2,600	129	2.2	NA	0.0	0.0	NA	0.0	0.0
VOC	1,2-Dichloroethane	83	8	9.6	NA	2.3	22,600	2	NA	0.0	0.0	NA	61.3	0.0
VOC	1,2-Dichloroethene (total)	57	1	1.8	NA	210	44,800	0.9	NA	0.0	0.0	NA	0.0	0.0
VOC	1,3-Dichlorobenzene	83	1	1.2	NA	1,300	129	0.11	NA	0.0	0.0	NA	0.0	0.0
VOC	1,4-Dichlorobenzene	83	6	7.2	NA	2.1	129	2.3	NA	16.7	0.0	NA	74.0	0.0
VOC	4-Methyl-2-Pentanone	63	1	1.6	NA	520,000	NA	20	NA	0.0	NA	NA	0.0	NA
VOC	Benzene	83	14	16.9	NA	0.37	700	7.8	NA	78.6	0.0	NA	100.0	0.0
VOC	Carbon Disulfide	77	4	5.2	NA	560	NA	4	NA	0.0	NA	NA	0.0	NA
VOC	Chlorobenzene	83	17	20.5	NA	390	129	85	NA	0.0	0.0	NA	0.0	0.0
VOC	Chloroethane	83	7	8.4	NA	6.5	NA	7	NA	14.3	NA	NA	61.8	NA
VOC	Chloroform	83	3	3.6	NA	0.7	6,400	14	NA	100.0	0.0	NA	62.5	0.0
VOC	Chloromethane	83	3	3.6	NA	92	6,400	4	NA	0.0	0.0	NA	0.0	0.0
VOC	cis-1,2-Dichloroethene	26	9	34.6	NA	210	44,800	0.81	NA	0.0	0.0	NA	0.0	0.0
VOC	Ethylbenzene	83	4	4.8	NA	3,100	86	51	NA	0.0	0.0	NA	0.0	0.0
VOC	Isopropylbenzene	14	3	21.4	NA	7.8	NA	0.9	NA	0.0	NA	NA	0.0	NA

TABLE 4.3.6-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 44 GROUNDWATER DATA, A-AQUIFER (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Maximum Detected Concentration (µg/L)	Detects Greater than HGAL (%)	Detects Greater than Vapor Intrusion Criteria (%)	Detects Greater than Surface Water Criteria (%)	Nondetects Greater than HGAL (%)	Nondetects Greater than Vapor Intrusion Criteria (%)	Nondetects Greater than Surface Water Criteria (%)
VOC	Naphthalene	66	1	1.5	NA	3.6	470	8	NA	100.0	0.0	NA	96.9	0.0
VOC	Tetrachloroethene	83	7	8.4	NA	0.54	450	6.88	NA	100.0	0.0	NA	65.8	0.0
VOC	Toluene	83	8	9.6	NA	1,400	5,000	1	NA	0.0	0.0	NA	0.0	0.0
VOC	Trichloroethene	83	6	7.2	NA	2.9	400	9	NA	50.0	0.0	NA	58.4	0.0
VOC	Trichlorofluoromethane	20	2	10.0	NA	180	NA	0.21	NA	0.0	NA	NA	0.0	NA
VOC	Xylene (Total)	69	5	7.3	NA	340	NA	39	NA	0.0	NA	NA	0.0	NA
SVOC	2,4-Dimethylphenol	59	1	1.7	NA	NA	NA	5	NA	NA	NA	NA	NA	NA
SVOC	4-Methylphenol	59	1	1.7	NA	NA	NA	4	NA	NA	NA	NA	NA	NA
SVOC	Diethylphthalate	66	1	1.5	NA	NA	588.8	10	NA	NA	0.0	NA	NA	0.0
SVOC	Pentachlorophenol	59	1	1.7	NA	NA	7.9	3	NA	NA	0.0	NA	NA	84.5
SVOC	Total LMW PAH	66	1	1.5	NA	NA	NA	76	NA	NA	NA	NA	NA	NA
SVOC	Total PAH	66	1	1.5	NA	NA	NA	976	NA	NA	NA	NA	NA	NA
CYAN	Cyanide	23	2	8.7	NA	NA	1	0.94	NA	NA	0.0	NA	NA	61.9
PEST	4,4'-DDD	66	2	3.0	NA	NA	0.72	0.078	NA	NA	0.0	NA	NA	1.6
PEST	4,4'-DDE	66	1	1.5	NA	NA	2.8	0.02	NA	NA	0.0	NA	NA	0.0
PEST	4,4'-DDT	66	3	4.6	NA	NA	0.001	0.2	NA	NA	100.0	NA	NA	100.0
PEST	beta-BHC	66	2	3.0	NA	NA	NA	0.39	NA	NA	NA	NA	NA	NA
PEST	delta-BHC	66	1	1.5	NA	NA	NA	0.008	NA	NA	NA	NA	NA	NA
PEST	Endrin Aldehyde	26	2	7.7	NA	NA	NA	0.028	NA	NA	NA	NA	NA	NA
PEST	Endrin Ketone	62	1	1.6	NA	NA	NA	0.01	NA	NA	NA	NA	NA	NA
PEST	gamma-Chlordane	66	1	1.5	NA	NA	0.004	0.007	NA	NA	100.0	NA	NA	100.0
PEST	Heptachlor Epoxide	62	1	1.6	NA	NA	0.0036	0.0073	NA	NA	100.0	NA	NA	100.0
PEST	Total Chlordane	66	2	3.0	NA	NA	NA	0.1646	NA	NA	NA	NA	NA	NA
PEST	Total DDT	66	4	6.1	NA	NA	NA	0.3	NA	NA	NA	NA	NA	NA
TPHEXT	Diesel Range Organics	62	9	14.5	NA	NA	20,000	3,000	NA	NA	0.0	NA	NA	0.0
TPHPRG	Gasoline Range Organics	62	6	9.7	NA	NA	20,000	490	NA	NA	0.0	NA	NA	0.0
TPHEXT	Motor Oil Range Organics	15	6	40.0	NA	NA	20,000	1,100	NA	NA	0.0	NA	NA	0.0
TPHEXT	TPH-Extractable Unknown Hydrocarbon	18	2	11.1	NA	NA	NA	900	NA	NA	NA	NA	NA	NA
TRPH	TRPH	10	1	10.0	NA	NA	NA	500	NA	NA	NA	NA	NA	NA

Notes: Data presented for all analytes detected in at least one sample.

Bold text indicates one or more detections exceeding criteria. Chemicals in bold text and shaded cells indicate one or more detections exceeding the applicable Parcel E screening criterion.

See Appendix D for full statistical analysis.

Total TPH groundwater criteria are based on distance from the shoreline and are listed in Table 4-1. All wells in Redevelopment Block 44 are located more than 250 feet from the shoreline; therefore, the total TPH groundwater criterion for Redevelopment Block 44 is 20,000 µg/L.

µg/L	Microgram per liter	HGAL	Hunters Point groundwater ambient level	SVOC	Semivolatile organic compound
BHC	Benzene hexachloride	LMW	Low molecular weight	TPH	Total petroleum hydrocarbons
CYAN	Cyanide	NA	Not applicable	TPHEXT	Total petroleum hydrocarbons - extractable
DDD	Dichlorodiphenyldichloroethane	NA1	Not applicable; chemical detected in all samples	TPHPRG	Total petroleum hydrocarbons - purgeable
DDE	Dichlorodiphenyldichloroethene	PAH	Polynuclear aromatic hydrocarbon	TRPH	Total recoverable petroleum hydrocarbons
DDT	Dichlorodiphenyltrichloroethane	PEST	Pesticide	VOC	Volatile organic compound

TABLE 4.3.7-1: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 45 SOIL DATA (0 TO 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Antimony	165	90	54.6	9.05	10.2	4.26	818	0.05	43.5	6.7	6.7	0.0	5.3	4.0	0.0
METAL	Arsenic	233	140	60.1	11.1	0.038	1,303	0.434	115.06	49.9	10.0	100.0	100.0	0.0	100.0	77.4
METAL	Cadmium	247	61	24.7	3.14	3.46	3.27	983	0.01	11.3	9.8	8.2	0.0	0.0	0.0	0.0
METAL	Copper	245	230	93.9	124.3	159	65.34	75,628	0.14	10,400	6.1	4.4	0.0	0.0	0.0	0.0
METAL	Iron	247	247	100.0	NA	21,963	3.48	613,200	0.12	76,500	NA	94.3	0.0	NA1	NA1	NA1
METAL	Lead	247	226	91.5%	8.99	155	30.31	800	6.06	4,850	34.5	4.9	1.8	9.5	0.0	0.0
METAL	Manganese	247	247	100.0	1431.2	843	7.16	32,251	0.19	6,040	15.0	46.2	0.0	NA1	NA1	NA1
METAL	Mercury	247	113	45.8	2.28	1.59	11.00	611	0.03	17.5	6.2	6.2	0.0	0.0	0.0	0.0
METAL	Nickel ^a	246	245	99.6	49.4-5804	302	9.27	20,692	0.14	2,800	0.0	72.2	0.0	0.0	0.0	0.0
METAL	Silver	231	20	8.7	1.43	49.7	1.21	10,220	0.01	59.9	50.0	5.0	0.0	24.6	0.0	0.0
METAL	Thallium	247	27	10.9	0.81	5.02	1.41	135	0.05	7.1	85.2	40.7	0.0	28.6	12.7	0.0
METAL	Vanadium	247	247	100.0	117.2	64.8	3.12	2,044	0.10	202	4.1	42.1	0.0	NA1	NA1	NA1
METAL	Zinc	247	245	99.2	109.9	373	14.47	613,200	0.01	5,400	13.5	3.3	0.0	0.0	0.0	0.0
SVOC	Benzo(a)anthracene	245	12	4.9	NA	0.370	3.51	1.76	0.74	1.3	NA	33.3	0.0	NA	62.2	9.0
SVOC	Benzo(a)pyrene	244	11	4.5	NA	0.037	25.20	0.176	5.35	0.94	NA	100.0	63.6	NA	100.0	82.0
SVOC	Benzo(b)fluoranthene	244	12	4.9	NA	0.338	7.39	1.76	1.42	2.5	NA	50.0	8.3	NA	81.9	9.9
SVOC	Benzo(k)fluoranthene	243	8	3.3	NA	0.338	2.22	1.76	0.43	0.75	NA	50.0	0.0	NA	82.1	9.8
SVOC	Bis(2-ethylhexyl)phthalate	245	2	0.8	NA	1.14	4.73	176	0.03	5.4	NA	100.0	0.0	NA	12.4	0.0
SVOC	Dibenz(a,h)anthracene	243	2	0.8	NA	0.058	2.42	0.289	0.49	0.14	NA	50.0	0.0	NA	100.0	82.6
SVOC	Indeno(1,2,3-cd)pyrene	242	6	2.5	NA	0.347	1.73	1.76	0.34	0.6	NA	50.0	0.0	NA	79.7	9.8
SVOC	Pentachlorophenol	246	2	0.8	NA	2.60	3.85	11.1	0.90	10	NA	50.0	0.0	NA	11.1	2.9
PEST	Dieldrin	247	1	0.4	NA	0.001	7.58	0.154	0.03	0.005	NA	100.0	0.0	NA	100.0	2.9
PCB	Aroclor-1254	247	1	0.4	NA	0.093	1.94	1.00	0.18	0.18	NA	100.0	0.0	NA	52.9	2.9
PCB	Aroclor-1260	247	19	7.7	NA	0.211	15.64	1.00	3.28	3.3	NA	42.1	21.1	NA	5.3	1.8

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.

See Appendix C for full statistical analysis.

a The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

bgs Below ground surface

Conc. Concentration

HPAL Hunters Point ambient level (for soil)

mg/kg Milligram per kilogram

NA Not applicable

NA1 Not applicable; chemical detected in all samples

PCB Polychlorinated biphenyl

PEST Pesticide

PQL Practical quantitation limit

SVOC Semivolatile organic compound

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.7-2: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 45 SOIL DATA (DEEPER THAN 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Antimony ^a	161	83	51.6	9.05	10.2	3.45	818	0.04	35.3	10.8	9.6	0.0	0.0	0.0	0.0
METAL	Arsenic ^a	174	107	61.5	11.1	0.038	658	0.434	58.1	25.2	7.5	100.0	99.1	0.0	100.0	41.8
METAL	Copper ^a	176	159	90.3	124.3	159	2.19	75,628	0.005	348	4.4	3.1	0.0	0.0	0.0	0.0
METAL	Iron ^a	176	176	100.0	NA	21,963	3.17	613,200	0.114	69,700	NA	85.8	0.0	NA1	NA1	NA1
METAL	Lead ^a	176	141	80.1	8.99	155	13.8	800	2.76	2,210	21.3	1.4	0.7	2.9	0.0	0.0
METAL	Manganese ^a	176	176	100.0	1431.2	843	11.5	32,251	0.300	9,680	20.5	40.9	0.0	NA1	NA1	NA1
METAL	Mercury ^a	176	49	27.8	2.28	1.59	4.21	611	0.011	6.70	2.0	6.1	0.0	0.0	0.0	0.0
METAL	Nickel ^b	176	176	100.0	78.5-5904	302	8.34	20,692	0.122	2,520	4.0	49.4	0.0	NA1	NA1	NA1
METAL	Vanadium ^a	176	176	100.0	117.2	64.8	3.96	2,044	0.126	257	10.2	41.5	0.0	NA1	NA1	NA1
METAL	Zinc ^a	176	171	97.2	109.9	373	1.47	613,200	0.001	548	8.2	0.6	0.0	0.0	0.0	0.0
VOC	Naphthalene ^c	173	6	3.5	NA	1.67	7.81	4.65	2.79	13.0	NA	16.7	16.7	NA	0.6	0.0
SVOC	Benzo(a)anthracene ^c	173	1	0.6	NA	0.370	24.1	1.76	5.07	8.90	NA	100.0	100.0	NA	95.4	0.6
SVOC	Benzo(b)fluoranthene ^c	173	2	1.2	NA	0.338	24.8	1.76	4.78	8.40	NA	50.0	50.0	NA	100.0	1.2
SVOC	Benzo(k)fluoranthene ^c	173	1	0.6	NA	0.338	10.3	1.76	1.99	3.50	NA	100.0	100.0	NA	100.0	1.2
SVOC	Bis(2-ethylhexyl)phthalate ^c	173	1	0.6	NA	1.14	123	176	0.795	140	NA	100.0	0.0	NA	5.8	0.0
SVOC	Carbazole	128	1	0.8	NA	2.24	3.08	123	0.056	6.90	NA	100.0	0.0	NA	0.0	0.0
SVOC	Chrysene	173	3	1.7	NA	3.30	4.24	17.6	0.797	14.0	NA	33.3	0.0	NA	0.0	0.0
PCB	Aroclor-1260	151	1	0.7	NA	0.211	2.08	1.00	0.438	0.440	NA	100.0	0.0	NA	0.7	0.0

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.
See Appendix C for full statistical analysis.

a Metal selection is based on samples from 0 to 10 feet bgs.

b The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

c Chemical not selected for nature and extent evaluation based on the percent of detections and the low number of detections that exceeded criteria.

bgs Below ground surface

Conc. Concentration

HPAL Hunters Point ambient level (for soil)

mg/kg Milligram per kilogram

NA Not applicable

NA1 Not applicable; chemical detected in all samples

PCB Polychlorinated biphenyl

PQL Practical quantitation limit

SVOC Semivolatile organic compound

VOC Volatile organic compound

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.7-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 45 GROUNDWATER DATA, A-AQUIFER

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Maximum Detected Concentration (µg/L)	Detects Greater than HGAL (%)	Detects Greater than Vapor Intrusion Criteria (%)	Detects Greater than Surface Water Criteria (%)	Nondetects Greater than HGAL (%)	Nondetects Greater than Vapor Intrusion Criteria (%)	Nondetects Greater than Surface Water Criteria (%)
METAL	Aluminum	46	3	6.5	NA	NA	NA	341	NA	NA	NA	NA	NA	NA
METAL	Antimony	46	8	17.4	43.26	NA	NA	40.3	0.0	NA	NA	2.6	NA	NA
METAL	Arsenic	48	10	20.8	27.34	NA	36	37.4	10.0	NA	10.0	0.0	NA	0.0
METAL	Barium	48	47	97.9	504.2	NA	NA	1,090	8.5	NA	NA	0.0	NA	NA
METAL	Beryllium	46	1	2.2	1.4	NA	NA	0.3	0.0	NA	NA	2.2	NA	NA
METAL	Cadmium	54	7	13.0	5.08	NA	8.8	13	42.9	NA	14.3	2.1	NA	2.1
METAL	Calcium	61	60	98.4	NA	NA	NA	304,000	NA	NA	NA	NA	NA	NA
METAL	Chromium	46	13	28.3	15.66	NA	50	15	0.0	NA	0.0	0.0	NA	0.0
METAL	Cobalt	46	9	19.6	20.8	NA	NA	62	11.1	NA	NA	0.0	NA	NA
METAL	Copper	49	13	26.5	28.04	NA	3.1	275	7.7	NA	30.8	0.0	NA	36.1
METAL	Iron	61	19	31.2	2,380	NA	NA	1,370	0.0	NA	NA	0.0	NA	NA
METAL	Lead	52	9	17.3	14.44	NA	5.6	133	22.2	NA	55.6	0.0	NA	2.3
METAL	Magnesium	61	60	98.4	1,440,000	NA	NA	959,000	0.0	NA	NA	0.0	NA	NA
METAL	Manganese	46	44	95.7	8,140	NA	NA	3,300	0.0	NA	NA	0.0	NA	NA
METAL	Molybdenum	46	17	37.0	61.9	NA	NA	66.5	11.8	NA	NA	0.0	NA	NA
METAL	Nickel	49	21	42.9	96.48	NA	8.2	302	4.8	NA	71.4	0.0	NA	53.6
METAL	Potassium	61	60	98.4	448,000	NA	NA	219,000	0.0	NA	NA	0.0	NA	NA
METAL	Selenium	42	2	4.8	14.5	NA	71	3.3	0.0	NA	0.0	12.5	NA	0.0
METAL	Silver	46	3	6.5	7.43	NA	0.38	5.8	0.0	NA	100.0	2.3	NA	100.0
METAL	Sodium	61	61	100.0	9,242,000	NA	NA	6,270,000	0.0	NA	NA	NA1	NA1	NA1
METAL	Thallium	36	1	2.8	12.97	NA	426	5.8	0.0	NA	0.0	2.9	NA	0.0
METAL	Vanadium	46	21	45.7	26.62	NA	NA	40.5	4.8	NA	NA	0.0	NA	NA
METAL	Zinc	49	4	8.2	75.68	NA	81	396	25.0	NA	25.0	0.0	NA	0.0
VOC	1,1,1-Trichloroethane	84	5	6.0	NA	3,100	6,240	2	NA	0.0	0.0	NA	0.0	0.0
VOC	1,1-Dichloroethane	84	2	2.4	NA	6.5	NA	0.3	NA	0.0	NA	NA	7.3	NA
VOC	1,2,4-Trichlorobenzene	84	1	1.2	NA	66	129	0.34	NA	0.0	0.0	NA	2.4	1.2
VOC	1,2-Dichlorobenzene	84	2	2.4	NA	2,600	129	84	NA	0.0	0.0	NA	0.0	1.2
VOC	1,2-Dichloroethene (total)	46	2	4.4	NA	210	44,800	2	NA	0.0	0.0	NA	0.0	0.0
VOC	1,3-Dichlorobenzene	84	1	1.2	NA	1,300	129	0.72	NA	0.0	0.0	NA	0.0	1.2
VOC	1,4-Dichlorobenzene	84	2	2.4	NA	2.1	129	19	NA	50.0	0.0	NA	56.1	1.2
VOC	Benzene	86	8	9.3	NA	0.37	700	2	NA	62.5	0.0	NA	100.0	0.0
VOC	Carbon Disulfide	69	3	4.4	NA	560	NA	12.3	NA	0.0	NA	NA	0.0	NA
VOC	Chlorobenzene	84	2	2.4	NA	390	129	3	NA	0.0	0.0	NA	0.0	0.0
VOC	Chloroethane	84	1	1.2	NA	6.5	NA	0.81	NA	0.0	NA	NA	34.9	NA
VOC	Chloroform	84	7	8.3	NA	0.7	6,400	2	NA	28.6	0.0	NA	46.8	0.0
VOC	cis-1,2-Dichloroethene	38	10	26.3	NA	210	44,800	1	NA	0.0	0.0	NA	0.0	0.0
VOC	Cyclohexane	16	1	6.3	NA	730	NA	6.1	NA	0.0	NA	NA	0.0	NA
VOC	Ethylbenzene	86	6	7.0	NA	3,100	86	72	NA	0.0	0.0	NA	0.0	0.0
VOC	Isopropylbenzene	16	3	18.8	NA	7.8	NA	12	NA	33.3	NA	NA	0.0	NA
VOC	Methylcyclohexane	16	1	6.3	NA	170	NA	1.5	NA	0.0	NA	NA	0.0	NA
VOC	Naphthalene	54	2	3.7	NA	3.6	470	27	NA	100.0	0.0	NA	98.1	1.9
VOC	tert-Butyl Methyl Ether	40	2	5.0	NA	390	8,000	3.7	NA	0.0	0.0	NA	0.0	0.0

TABLE 4.3.7-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK 45 GROUNDWATER DATA, A-AQUIFER (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Maximum Detected Concentration (µg/L)	Detects Greater than HGAL (%)	Detects Greater than Vapor Intrusion Criteria (%)	Detects Greater than Surface Water Criteria (%)	Nondetects Greater than HGAL (%)	Nondetects Greater than Vapor Intrusion Criteria (%)	Nondetects Greater than Surface Water Criteria (%)
VOC	Tetrachloroethene	84	4	4.8	NA	0.54	450	56	NA	25.0	0.0	NA	45.0	0.0
VOC	Toluene	86	6	7.0	NA	1,400	5,000	0.3	NA	0.0	0.0	NA	0.0	0.0
VOC	Trichloroethene	84	29	34.5	NA	2.9	400	10.3	NA	51.7	0.0	NA	45.5	0.0
VOC	Xylene (total)	68	4	5.9	NA	340	NA	27	NA	0.0	NA	NA	0.0	NA
SVOC	2-Methylnaphthalene	54	5	9.3	NA	710	NA	150	NA	0.0	NA	NA	0.0	NA
SVOC	Acenaphthene	54	2	3.7	NA	33,000	710	28	NA	0.0	0.0	NA	0.0	1.9
SVOC	Anthracene	54	1	1.9	NA	390,000	60	21	NA	0.0	0.0	NA	0.0	1.9
SVOC	Chrysene	54	1	1.9	NA	NA	60	35	NA	NA	0.0	NA	NA	1.9
SVOC	Fluorene	54	3	5.6	NA	44,000	60	100	NA	0.0	33.3	NA	0.0	2.0
SVOC	Phenanthrene	54	1	1.9	NA	190,000	60	210	NA	0.0	100.0	NA	0.0	1.9
SVOC	Pyrene	54	1	1.9	NA	230,000	60	24	NA	0.0	0.0	NA	0.0	1.9
SVOC	Total HMW PAH	54	1	1.9	NA	NA	NA	643	NA	NA	NA	NA	NA	NA
SVOC	Total LMW PAH	54	6	11.1	NA	NA	NA	6,300	NA	NA	NA	NA	NA	NA
SVOC	Total PAH	54	6	11.1	NA	NA	NA	15,300	NA	NA	NA	NA	NA	NA
PEST	Endosulfan I	54	1	1.9	NA	NA	0.0087	0.002	NA	NA	0.0	NA	NA	98.1
PCB	Aroclor-1260	47	1	2.1	NA	NA	0.03	0.2	NA	NA	100.0	NA	NA	100.0
PCB	Total Aroclor	47	1	2.1	NA	NA	NA	1.7	NA	NA	NA	NA	NA	NA
TPHEXT	Diesel Range Organics	53	14	26.4	NA	NA	20,000	390,000	NA	NA	1.9	NA	NA	1.9
TPHPRG	Gasoline-Range Organics	53	13	24.5	NA	NA	20,000	10,000	NA	NA	0.0	NA	NA	0.0
TPHEXT	Motor Oil-Range Organics	26	11	42.3	NA	NA	20,000	5,900	NA	NA	0.0	NA	NA	0.0
TPHPRG	TPH-Purgeable Unknown Hydrocarbon	14	1	7.1	NA	NA	NA	45	NA	NA	NA	NA	NA	NA
TRPH	TRPH	19	6	31.6	NA	NA	NA	40,000	NA	NA	NA	NA	NA	NA

Notes: Data presented for all analytes detected in at least one sample.

Bold text indicates one or more detections exceeding criteria. Chemicals in bold text and shaded cells indicate one or more detections exceeding the applicable Parcel E screening criterion.

See Appendix D for full statistical analysis.

Total TPH groundwater criteria are based on distance from the shoreline and are listed in Table 4-1. All wells in Redevelopment Block 45 are located more than 250 feet from the shoreline; therefore, the total TPH groundwater criterion for Redevelopment Block 45 is 20,000 µg/L.

µg/L	Microgram per liter	PEST	Pesticide
HGAL	Hunters Point groundwater ambient level	SVOC	Semivolatile organic compound
HMW	High molecular weight	TPH	Total petroleum hydrocarbons
LMW	Low molecular weight	TPHEXT	Total petroleum hydrocarbons - extractable
NA	Not applicable	TPHPRG	Total petroleum hydrocarbons - purgeable
NA1	Not applicable; chemical detected in all samples	TRPH	Total recoverable petroleum hydrocarbons
PAH	Polynuclear aromatic hydrocarbons	VOC	Volatile organic compound
PCB	Polychlorinated biphenyl		

TABLE 4.3.8-1: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EMI-1 SOIL DATA (0 TO 10 FEET BGS)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Antimony	293	77	26.3	9.05	10.2	1.46	818	0.018	14.9	16.9	9.1	0.0	7.9	6.9	0.0
METAL	Arsenic	351	258	73.5	11.1	0.038	2,599	0.434	229	99.5	9.3	100.0	100.0	0.0	100.0	96.8
METAL	Barium	356	349	98.0	314.4	7,502	2.67	285,034	0.070	20,000	7.2	0.3	0.0	0.0	0.0	0.0
METAL	Cadmium	355	63	17.8	3.14	3.46	1.88	983	0.007	6.50	14.3	14.3	0.0	0.3	0.0	0.0
METAL	Copper	356	340	95.5	124.3	159	94.2	75,628	0.198	15,000	9.4	6.5	0.0	0.0	0.0	0.0
METAL	Iron	356	356	100.0	NA	21,963	3.82	613,200	0.137	84,000	NA	65.2	0.0	NA1	NA1	NA1
METAL	Lead	372	289	77.7	8.99	155	26.9	800	5.38	4,300	56.4	4.8	1.4	0.0	0.0	0.0
METAL	Manganese	356	356	100.0	1431.2	843	14.8	32,251	0.388	12,500	8.2	35.7	0.0	NA1	NA1	NA1
METAL	Mercury	354	241	68.1	2.28	1.59	374	611	0.974	595	4.2	6.6	0.0	0.0	0.0	0.0
METAL	Molybdenum	339	36	10.6	2.68	76.3	1.17	10,220	0.009	89.0	22.2	2.8	0.0	20.1	0.0	0.0
METAL	Nickel ^a	356	356	100.0	21.2-5478	302	9.27	20,692	0.135	2,800	0.0	18.0	0.0	NA1	NA1	NA1
METAL	Vanadium	356	355	99.7	117.2	65	7.56	2,044	0.240	490	7.9	38.3	0.0	0.0	0.0	0.0
METAL	Zinc	356	350	98.3	109.9	373	11.0	613,200	0.007	4,100	21.1	4.6	0.0	0.0	0.0	0.0
SVOC	Benzo(a)anthracene ^c	454	92	20.3	NA	0.370	12.7	1.76	2.68	4.70	NA	23.9	3.3	NA	37.9	8.8
SVOC	Benzo(a)pyrene	438	93	21.2	NA	0.037	142	0.176	30.2	5.30	NA	91.4	36.6	NA	91.3	79.4
SVOC	Benzo(b)fluoranthene	439	140	21.2	NA	0.338	27.8	1.76	5.35	9.40	NA	19.3	3.6	NA	62.9	11.0
SVOC	Benzo(k)fluoranthene ^c	435	91	20.9	NA	0.338	9.46	1.76	1.82	3.20	NA	18.7	4.4	NA	58.7	9.3
SVOC	Bis(2-ethylhexyl)phthalate	341	4	1.2	NA	1.14	1.93	176	0.012	2.20	NA	25.0	0.0	NA	13.1	0.0
SVOC	Chrysene	454	128	28.2	NA	3.30	1.48	17.6	0.279	4.90	NA	3.1	0.0	NA	6.8	0.0
SVOC	Dibenz(a,h)anthracene ^d	432	21	4.9	NA	0.058	17.3	0.289	3.46	1.00	NA	52.4	9.5	NA	89.5	56.9
SVOC	Indeno(1,2,3-cd)pyrene ^b	435	58	13.3	NA	0.347	8.06	1.76	1.59	2.80	NA	17.2	3.5	NA	52.8	8.2
SVOC	n-Nitroso-di-n-propylamine ^b	342	1	0.3	NA	0.00017	982	0.352	0.482	0.170	NA	100.0	0.0	NA	94.7	75.1
PEST	4,4'-DDT	347	56	16.1	NA	1.21	1.91	12.06	0.191	2.30	NA	1.8	0.0	NA	0.0	0.0
PEST	Dieldrin	345	3	0.9	NA	0.00066	7.58	0.154	0.032	0.005	NA	100.0	0.0	NA	98.3	4.1
PEST	gamma-BHC (lindane) ^b	345	2	0.6	NA	0.003	52.9	2.88	0.049	0.140	NA	50.0	0.0	NA	58.9	0.0
PEST	Heptachlor Epoxide ^b	345	3	0.9	NA	0.00054	29.7	0.271	0.059	0.016	NA	100.0	0.0	NA	98.0	0.0
PEST	Hexachlorobenzene	15	4	26.7	NA	0.054	1.39	1.37	0.055	0.075	NA	25.0	0.0	NA	0.0	0.0
PCB	Aroclor-1254	430	13	3.0	NA	0.093	409	1.00	37.8	38.0	NA	61.5	38.5	NA	42.2	3.1
PCB	Aroclor-1260	430	45	10.5	NA	0.211	7.58	1.00	1.59	1.60	NA	22.2	6.7	NA	9.6	3.4
DIOXIN	1,2,3,4,6,7,8-HPCDD	19	9	47.4	NA	0.00036	2.78	0.0027	0.366	0.001	NA	11.1	0.0	NA	30.0	0.0
DIOXIN	1,2,3,4,6,7,8-HPCDF	19	8	42.1	NA	0.00036	1.11	0.0027	0.146	0.0004	NA	12.5	0.0	NA	18.2	0.0

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.
See Appendix C for full statistical analysis.

- a The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.
b Chemical not selected for nature and extent evaluation based on the percent of detections and the low number of detections that exceeded criteria.
c Chemical not selected for nature and extent evaluation based on collocation with selected chemical.
d Chemical not selected for nature and extent evaluation because of PQL factor.

bgs	Below ground surface	mg/kg	Milligram per kilogram
BHC	Benzene hexachloride	NA	Not applicable
Conc.	Concentration	NA1	Not applicable; chemical detected in all samples
DDT	Dichlorodiphenyltrichloroethane	PCB	Polychlorinated biphenyl
HPAL	Hunters Point ambient level (for soil)	PEST	Pesticide
HPCDD	Heptachlorodibenzo-p-dioxin	PQL	Practical quantitation limit
HPCDF	Heptachlorodibenzofuran	SVOC	Semivolatile organic compound

Source: Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.8-2: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EMI-1 SOIL DATA (DEEPER THAN 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Antimony	77	16	20.8	9.05	10.2	1.18	818	0.015	12.1	12.5	12.5	0.0	1.6	1.6	0.0
METAL	Arsenic ^a	86	68	79.1	11.1	0.038	353	0.434	31.1	13.5	5.9	100.0	98.5	0.0	100.0	94.4
METAL	Copper	89	87	97.8	124.3	159	2.87	75,628	0.006	457	4.6	4.6	0.0	0.0	0.0	0.0
METAL	Iron	89	89	100.0	NA	21,963	3.63	613,200	0.130	79,800	NA	65.2	0.0	NA1	NA1	NA1
METAL	Manganese	89	89	100.0	1,431.2	843	3.42	32,251	0.089	2,880	1.1	24.7	0.0	NA1	NA1	NA1
METAL	Mercury	88	25	28.4	2.28	1.59	8.80	611	0.023	14.0	4.0	4.0	0.0	0.0	0.0	0.0
METAL	Nickel ^{a,b}	89	89	100.0	51.6-9,950	302	11.4	20,692	0.166	3,440	0.0	13.5	0.0	NA1	NA1	NA1
METAL	Vanadium	89	89	100.0	117.2	64.8	2.53	2,044	0.080	164	6.7	47.2	0.0	NA1	NA1	NA1
SVOC	Benzo(a)anthracene	88	7	8.0	NA	0.370	3.24	1.76	0.683	1.20	NA	42.9	0.0	NA	87.7	7.4
SVOC	Benzo(a)pyrene	88	9	10.2	NA	0.037	61.6	0.176	13.1	2.30	NA	100.0	66.7	NA	100.0	100.0
SVOC	Benzo(b)fluoranthene	88	8	9.1	NA	0.338	7.68	1.76	1.48	2.60	NA	50.0	12.5	NA	100.0	8.8
SVOC	Benzo(k)fluoranthene	88	4	4.6	NA	0.338	3.55	1.76	0.683	1.20	NA	25.0	0.0	NA	100.0	8.3
SVOC	Dibenz(a,h)anthracene	88	1	1.1	NA	0.058	1.49	0.289	0.298	0.086	NA	100.0	0.0	NA	100.0	100.0
SVOC	Indeno(1,2,3-cd)pyrene	88	5	5.7	NA	0.347	2.02	1.76	0.399	0.700	NA	40.0	0.0	NA	100.0	8.4

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.

See Appendix C for full statistical analysis.

a Metal selection is based on samples from 0 to 10 feet bgs.

b The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

bgs Below ground surface

Conc. Concentration

HPAL Hunters Point ambient level (for soil)

mg/kg Milligram per kilogram

NA Not applicable

NA1 Not applicable; chemical detected in all samples

PQL Practical quantitation limit

SVOC Semivolatile organic compound

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.8-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EMI-1 GROUNDWATER DATA, A-AQUIFER

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Maximum Detected Concentration (µg/L)	Detects Greater than HGAL (%)	Detects Greater than Vapor Intrusion Criteria (%)	Detects Greater than Surface Water Criteria (%)	Nondetects Greater than HGAL (%)	Nondetects Greater than Vapor Intrusion Criteria (%)	Nondetects Greater than Surface Water Criteria (%)
METAL	Aluminum	56	13	23.2	NA	NA	NA	724	NA	NA	NA	NA	NA	NA
METAL	Antimony	59	11	18.6	43.26	NA	NA	47.3	9.1	NA	NA	2.1	NA	NA
METAL	Arsenic	61	24	39.3	27.34	NA	36	42.7	20.8	NA	12.5	13.5	NA	2.7
METAL	Barium	58	56	96.6	504.2	NA	NA	3,920	5.4	NA	NA	0.0	NA	NA
METAL	Beryllium	56	1	1.8	1.4	NA	NA	1.2	0.0	NA	NA	9.1	NA	NA
METAL	Cadmium	63	6	9.5	5.08	NA	8.8	14.1	33.3	NA	16.7	1.8	NA	1.8
METAL	Calcium	64	62	96.9	NA	NA	NA	768,000	NA	NA	NA	NA	NA	NA
METAL	Chromium	56	6	10.7	15.66	NA	50	9.7	0.0	NA	0.0	2.0	NA	0.0
METAL	Cobalt	56	10	17.9	20.8	NA	NA	12.7	0.0	NA	NA	2.2	NA	NA
METAL	Copper	65	17	26.2	28.04	NA	3.1	98	5.9	NA	70.6	2.1	NA	43.8
METAL	Iron	65	36	55.4	2,380	NA	NA	2,850	8.3	NA	NA	0.0	NA	NA
METAL	Lead	62	14	22.6	14.44	NA	5.6	127	21.4	NA	35.7	4.2	NA	8.3
METAL	Magnesium	64	62	96.9	1,440,000	NA	NA	1,070,000	0.0	NA	NA	0.0	NA	NA
METAL	Manganese	56	51	91.1	8,140	NA	NA	5280	0.0	NA	NA	0.0	NA	NA
METAL	Mercury	59	2	3.4	0.6	NA	0.025	0.91	50.0	NA	100.0	0.0	NA	100.0
METAL	Molybdenum	50	17	34.0	61.9	NA	NA	11.4	0.0	NA	NA	0.0	NA	NA
METAL	Nickel	66	19	28.8	96.48	NA	8.2	130	10.5	NA	52.6	0.0	NA	53.2
METAL	Potassium	65	63	96.9	448,000	NA	NA	362000	0.0	NA	NA	0.0	NA	NA
METAL	Selenium	42	4	9.5	14.5	NA	71	17.4	25.0	NA	0.0	13.2	NA	0.0
METAL	Silver	59	4	6.8	7.43	NA	0.38	7.5	25.0	NA	75.0	5.5	NA	98.2
METAL	Sodium	65	65	100.0	9,242,000	NA	NA	9700000	1.5	NA	NA	NA1	NA1	NA1
METAL	Thallium	51	4	7.8	12.97	NA	426	18	25.0	NA	0.0	10.6	NA	0.0
METAL	Vanadium	53	27	50.9	26.62	NA	NA	43.6	7.4	NA	NA	0.0	NA	NA
METAL	Zinc	56	6	10.7	75.68	NA	81	49.1	0.0	NA	0.0	4.0	NA	4.0
VOC	1,1-Dichloroethane	73	12	16.4	NA	6.5	NA	8.71	NA	8.3	NA	NA	6.6	NA
VOC	1,2-Dichlorobenzene	73	2	2.7	NA	2,600	129	0.28	NA	0.0	0.0	NA	0.0	1.4
VOC	1,2-Dichloroethane	73	3	4.1	NA	2.3	22,600	1	NA	0.0	0.0	NA	52.9	0.0
VOC	1,4-Dichlorobenzene	73	3	4.1	NA	2.1	129	1.2	NA	0.0	0.0	NA	74.3	1.4
VOC	Benzene	73	3	4.1	NA	0.37	700	1	NA	33.3	0.0	NA	100.0	0.0
VOC	Carbon Tetrachloride	73	1	1.4	NA	0.046	6,400	2	NA	100.0	0.0	NA	100.0	0.0
VOC	Chloroform	73	2	2.7	NA	0.7	6,400	2.3	NA	100.0	0.0	NA	59.2	0.0
VOC	cis-1,2-Dichloroethene	21	5	23.8	NA	210	44,800	0.3	NA	0.0	0.0	NA	0.0	0.0
VOC	Tetrachloroethene	73	3	4.1	NA	0.54	450	38	NA	100.0	0.0	NA	58.6	0.0
VOC	Toluene	73	1	1.4	NA	1,400	5,000	0.43	NA	0.0	0.0	NA	0.0	0.0
VOC	Trichloroethene	73	2	2.7	NA	2.9	400	1	NA	0.0	0.0	NA	50.7	0.0
VOC	Xylene (Total)	60	1	1.7	NA	340	NA	0.1	NA	0.0	NA	NA	0.0	NA
SVOC	2-Chlorophenol	61	1	1.6	NA	1,100	NA	51	NA	0.0	NA	NA	0.0	NA
SVOC	2-Methylnaphthalene	61	3	4.9	NA	710	NA	34	NA	0.0	NA	NA	1.7	NA
SVOC	4-Chloro-3-Methylphenol	61	1	1.6	NA	NA	NA	46	NA	NA	NA	NA	NA	NA
SVOC	4-Nitrophenol	61	1	1.6	NA	NA	970	21	NA	NA	0.0	NA	NA	1.7
SVOC	Acenaphthene	61	2	3.3	NA	33,000	710	13	NA	0.0	0.0	NA	0.0	1.7
SVOC	Anthracene	61	2	3.3	NA	390,000	60	8	NA	0.0	0.0	NA	0.0	3.4

TABLE 4.3.8-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EMI-1 GROUNDWATER DATA, A-AQUIFER (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Maximum Detected Concentration (µg/L)	Detects Greater than HGAL (%)	Detects Greater than Vapor Intrusion Criteria (%)	Detects Greater than Surface Water Criteria (%)	Nondetects Greater than HGAL (%)	Nondetects Greater than Vapor Intrusion Criteria (%)	Nondetects Greater than Surface Water Criteria (%)
SVOC	Benzo(a)Anthracene	61	1	1.6	NA	NA	60	3	NA	NA	0.0	NA	NA	5.0
SVOC	Chrysene	61	2	3.3	NA	NA	60	14	NA	NA	0.0	NA	NA	5.1
SVOC	Fluorene	61	2	3.3	NA	44,000	60	35	NA	0.0	0.0	NA	0.0	3.4
SVOC	Pentachlorophenol	61	1	1.6	NA	NA	7.9	33	NA	NA	100.0	NA	NA	85.0
SVOC	Phenanthrene	61	2	3.3	NA	190,000	60	35	NA	0.0	0.0	NA	0.0	3.4
SVOC	Phenol	61	1	1.6	NA	NA	1,160	24	NA	NA	0.0	NA	NA	0.0
SVOC	Pyrene	61	3	4.9	NA	230,000	60	17	NA	0.0	0.0	NA	0.0	5.2
SVOC	Total HMW PAH	62	3	4.8	NA	NA	NA	235	NA	NA	NA	NA	NA	NA
SVOC	Total LMW PAH	61	4	6.6	NA	NA	NA	212	NA	NA	NA	NA	NA	NA
SVOC	Total PAH	62	5	8.1	NA	NA	NA	972	NA	NA	NA	NA	NA	NA
CYAN	Cyanide	7	1	14.3	NA	NA	1	0.98	NA	NA	0.0	NA	NA	33.3
PEST	gamma-Chlordane	57	1	1.8	NA	NA	0.004	0.005	NA	NA	100.0	NA	NA	100.0
PEST	Total Chlordane	57	1	1.8	NA	NA	NA	0.025	NA	NA	NA	NA	NA	NA
TPHEXT	Diesel-Range Organics	68	18	26.5	NA	NA	20,000	280,000	NA	NA	2.9	NA	NA	2.9
TPHPRG	Gasoline-Range Organics	67	8	11.9	NA	NA	20,000	22,000	NA	NA	1.5	NA	NA	0.0
TPHEXT	Motor Oil-Range Organics	27	16	59.3	NA	NA	20,000	3,500	NA	NA	0.0	NA	NA	0.0
TPHEXT	TPH-Extractable Unknown Hydrocarbon	18	3	16.7	NA	NA	NA	74,000	NA	NA	NA	NA	NA	NA
TRPH	TRPH	13	4	30.8	NA	NA	NA	5,000	NA	NA	NA	NA	NA	NA

Notes: Data presented for all analytes detected in at least one sample.

Bold text indicates one or more detections exceeding criteria. Chemicals in bold text and shaded cells indicate one or more detections exceeding the applicable Parcel E screening criterion.

See Appendix D for full statistical analysis.

Total TPH groundwater criteria are based on distance from the shoreline and are listed in Table 4-1. Only well, IR02MW179A, is located within 200 feet of the shoreline and TPH was not detected in this well. The remaining wells in Redevelopment Block EMI-1 are located more than 200 feet from the shoreline; therefore, the total TPH groundwater criterion for Redevelopment Block EMI-1 is 20,000 µg/L.

µg/L	Microgram per liter
CYAN	Cyanide
HGAL	Hunters Point groundwater ambient level
HMW	High molecular weight
LMW	Low molecular weight
NA	Not applicable
NA1	Not applicable; chemical detected in all samples
PAH	Polynuclear aromatic hydrocarbon
PEST	Pesticide
SVOC	Semivolatile organic compound
TPH	Total petroleum hydrocarbons
TPHEXT	Total petroleum hydrocarbons - extractable
TPHPRG	Total petroleum hydrocarbons - purgeable
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compound

TABLE 4.3.8-4: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EMI-1 GROUNDWATER DATA, BEDROCK WATER-BEARING ZONE

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Maximum Detected Concentration (µg/L)	Detections Greater than HGAL (%)	Detections Greater than Vapor Intrusion Criteria (%)	Detections Greater than Surface Water Criteria (%)	Nondetections Greater than HGAL (%)	Nondetections Greater than Vapor Intrusion Criteria (%)	Nondetections Greater than Surface Water Criteria (%)
METAL	Arsenic	9	7	77.8	27.34	NA	36	67.6	14.3	NA	14.3	0.0	NA	0.0
METAL	Barium	6	6	100.0	504.2	NA	NA	34.6	0.0	NA	NA	NA1	NA1	NA1
METAL	Calcium	6	6	100.0	NA	NA	NA	34,100	NA	NA	NA	NA1	NA1	NA1
METAL	Chromium	6	1	16.7	15.66	NA	50	3	0.0	NA	0.0	0.0	NA	0.0
METAL	Copper	7	5	71.4	28.04	NA	3.1	11.2	0.0	NA	80.0	0.0	NA	0.0
METAL	Iron	7	1	14.3	2,380	NA	NA	543	0.0	NA	NA	0.0	NA	NA
METAL	Lead	6	1	16.7	14.44	NA	5.6	7.1	0.0	NA	100.0	0.0	NA	20.0
METAL	Magnesium	6	6	100.0	1,440,000	NA	NA	88,300	0.0	NA	NA	NA1	NA1	NA1
METAL	Manganese	6	6	100.0	8140	NA	NA	152	0.0	NA	NA	NA1	NA1	NA1
METAL	Molybdenum	6	5	83.3	61.9	NA	NA	66.8	20.0	NA	NA	0.0	NA	NA
METAL	Nickel	7	5	71.4	96.48	NA	8.2	26.4	0.0	NA	60.0	0.0	NA	50.0
METAL	Potassium	7	7	100.0	448,000	NA	NA	112,000	0.0	NA	NA	NA1	NA1	NA1
METAL	Selenium	6	1	16.7	14.5	NA	71	13.9	0.0	NA	0.0	0.0	NA	0.0
METAL	Sodium	7	6	85.7	9,242,000	NA	NA	2,500,000	0.0	NA	NA	0.0	NA	NA
METAL	Vanadium	6	6	100.0	26.62	NA	NA	20.8	0.0	NA	NA	NA1	NA1	NA1
VOC	1,2-Dichlorobenzene	15	2	13.3	NA	2,600	129	0.66	NA	0.0	0.0	NA	0.0	0.0
VOC	1,4-Dichlorobenzene	15	1	6.7	NA	2.1	129	0.18	NA	0.0	0.0	NA	42.9	0.0
VOC	Isopropylbenzene	4	1	25.0	NA	7.8	NA	0.08	NA	0.0	NA	NA	0.0	NA
VOC	Tetrachloroethene	15	1	6.7	NA	0.54	450	0.36	NA	0.0	0.0	NA	50.0	0.0
VOC	Toluene	15	2	13.3	NA	1,400	5,000	0.28	NA	0.0	0.0	NA	0.0	0.0
VOC	Trichloroethene	15	1	6.7	NA	2.9	400	1	NA	0.0	0.0	NA	21.4	0.0
SVOC	bis(2-Ethylhexyl)Phthalate	6	1	16.7	NA	NA	NA	110	NA	NA	NA	NA	NA	NA
TPHEXT	Diesel-Range Organics	6	1	16.7	NA	NA	20,000	140	NA	NA	0.0	NA	NA	0.0
TPHEXT	Motor Oil-Range Organics	2	1	50.0	NA	NA	20,000	75	NA	NA	0.0	NA	NA	0.0
TPHEXT	TPH-Extractable Unknown Hydrocarbon	2	2	100.0	NA	NA	NA	600	NA	NA	NA	NA1	NA1	NA1

Notes: Data presented for all analytes detected in at least one sample.

Bold text indicates one or more detections exceeding criteria. Chemicals in **bold text** and shaded cells indicate one or more detections exceeding the applicable Parcel E screening criterion.

See Appendix D for full statistical analysis.

Total TPH groundwater criteria are based on distance from the shoreline and are listed in Table 4-1. All bedrock WBZ wells in Redevelopment Block EMI-1 are located more than 200 feet from the shoreline; therefore, the total TPH groundwater criterion for the bedrock WBZ in Redevelopment Block EMI-1 is 20,000 µg/L.

µg/L Microgram per liter
 HGAL Hunters Point groundwater ambient level
 NA Not applicable
 NA1 Not applicable; chemical detected in all samples
 SVOC Semivolatile organic compound
 TPH Total petroleum hydrocarbons
 TPHEXT Total petroleum hydrocarbons - extractable
 VOC Volatile organic compound
 WBZ Water-bearing zone

TABLE 4.3.9-1: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-1 SOIL DATA (0 TO 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Antimony ^a	165	61	37.0	9.05	10.2	189	818	2.36	1,930	72.1	68.9	3.3	0.0	0.0	0.0
METAL	Arsenic ^a	179	133	74.3	11.1	0.038	2,228	0.434	196.69	85.3	20.3	100.0	100.0	0.0	100.0	100.0
METAL	Barium	179	169	94.4	314.4	7,502	2.16	285,034	0.06	16,200	16.6	0.6	0.0	0.0	0.0	0.0
METAL	Cadmium ^a	179	76	42.5	3.14	3.46	29.5	983	0.10	102	38.2	36.8	0.0	0.0	0.0	0.0
METAL	Cobalt	179	166	92.7	5.85-144 ^a	903	1.53	1,921	0.72	1,380	3.6	0.6	0.0	0.0	0.0	0.0
METAL	Copper	179	178	99.4	124.3	159	1,244	75,628	2.62	198,000	52.3	47.8	1.1	0.0	0.0	0.0
METAL	Iron	179	179	100.0	NA	21,963	9.11	613,200	0.33	200,000	NA	86.0	0.0	NA1	NA1	NA1
METAL	Lead	179	141	78.8	8.99	155	123	800	24.63	19,700	95.0	54.6	21.3	13.2	0.0	0.0
METAL	Manganese	179	179	100.0	1,431.20	843	30.8	32,251	0.81	26,000	12.3	45.3	0.0	NA1	NA1	NA1
METAL	Mercury ^a	178	166	93.3	2.28	1.59	58.4	611	0.15	93.00	20.5	25.9	0.0	0.0	0.0	0.0
METAL	Molybdenum	168	83	49.4	2.68	76.3	1.79	10,220	0.01	137	53.0	2.4	0.0	5.9	0.0	0.0
METAL	Nickel ^{b,c}	179	179	100.0	0.416-181,382	302	34.1	20,692	0.50	10,300	5.0	47.5	0.0	NA1	NA1	NA1
METAL	Silver	179	44	24.6	1.43	49.7	1.65	10,220	0.01	82.00	77.3	2.3	0.0	2.2	0.0	0.0
METAL	Vanadium	179	177	98.9	117.2	64.8	11.1	2,044	0.35	720	11.9	39.0	0.0	0.0	0.0	0.0
METAL	Zinc ^c	179	178	99.4	109.9	373	67.0	613,200	0.04	25,000	61.8	39.9	0.0	0.0	0.0	0.0
VOC	1,2,4-Trichlorobenzene ^e	180	9	5.0	NA	67.8	12.2	240	3.46	830	NA	11.1	11.1	NA	0.0	0.0
VOC	1,4-Dichlorobenzene	180	3	1.7	NA	2.01	1.89	4.54	0.84	3.80	NA	33.3	0.0	NA	6.8	5.1
VOC	Naphthalene ^e	194	26	13.4	NA	1.67	19.8	4.65	7.09	33.0	NA	15.4	7.7	NA	9.5	3.6
VOC	Trichloroethene ^e	86	14	16.3	NA	2.94	2.31	6.56	1.04	6.80	NA	7.1	7.1	NA	1.4	1.4
VOC	Vinyl Chloride ^e	86	1	1.2	NA	0.02	1.07	0.055	0.48	0.026	NA	100.0	0.0	NA	7.1	4.7
SVOC	2-Methylnaphthalene	190	25	13.2	NA	145	1.45	798	0.26	210	NA	4.0	0.0	NA	0.0	0.0
SVOC	4-Nitrophenol	172	1	0.6	NA	0.288	1.32	440	0.00	0.380	NA	100.0	0.0	NA	100.0	0.0
SVOC	Benzo(a)anthracene	190	71	37.4	NA	0.370	97.3	1.76	20.50	36.0	NA	33.8	12.7	NA	55.5	8.4
SVOC	Benzo(a)pyrene ^a	187	77	41.2	NA	0.037	375	0.176	79.73	14.0	NA	98.7	59.7	NA	100.0	93.6
SVOC	Benzo(b)fluoranthene	187	88	47.1	NA	0.338	62.1	1.76	11.96	21.0	NA	52.3	15.9	NA	60.6	9.1
SVOC	Benzo(k)fluoranthene ^e	187	26	13.9	NA	0.338	59.1	1.76	11.39	20.0	NA	42.3	15.4	NA	62.7	8.7
SVOC	Bis(2-ethylhexyl)phthalate ^e	176	4	2.3	NA	1.14	27.2	176	0.18	31.0	NA	100.0	0.0	NA	15.1	0.0
SVOC	Chrysene ^c	190	99	52.1	NA	3.30	10.6	17.6	1.99	35.0	NA	12.1	3.0	NA	2.2	0.0
SVOC	Dibenz(a,h)anthracene ^e	186	21	11.3	NA	0.058	29.4	0.289	5.89	1.70	NA	76.2	42.9	NA	100.0	66.1
SVOC	Hexachlorobenzene	176	2	1.1	NA	0.054	2.42	1.37	0.09	0.130	NA	50.0	0.0	NA	100.0	16.7
SVOC	Indeno(1,2,3-cd)pyrene ^e	187	52	27.8	NA	0.347	10.7	1.76	2.11	3.70	NA	34.6	9.6	NA	60.7	8.2
PEST	4,4'-DDT	181	49	27.1	NA	1.21	5.81	12.1	0.58	7.00	NA	4.1	0.0	NA	5.3	0.8
PEST	Aldrin ^c	181	2	1.1	NA	0.024	27.0	0.145	4.48	0.650	NA	50.0	50.0	NA	15.1	6.7
PEST	alpha-BHC	181	1	0.6	NA	0.002	8.45	0.594	0.03	0.016	NA	100.0	0.0	NA	90.6	4.4
PEST	Dieldrin ^c	181	2	1.1	NA	0.001	45.5	0.154	0.19	0.030	NA	100.0	0.0	NA	100.0	10.1
PEST	gamma-BHC (lindane)	181	2	1.1	NA	0.003	6.42	2.88	0.01	0.017	NA	100.0	0.0	NA	67.6	1.1

TABLE 4.3.9-1: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-1 SOIL DATA (0 TO 10 FEET BGS) (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
PCB	Aroclor-1242	176	1	0.6	NA	0.177	2.31	1.00	0.41	0.410	NA	100.0	0.0	NA	19.4	6.3
PCB	Aroclor-1248	176	2	1.1	NA	0.201	2.79	1.00	0.56	0.560	NA	50.0	0.0	NA	14.4	6.3
PCB	Aroclor-1254 ^a	176	17	9.7	NA	0.093	23.7	1.00	2.19	2.20	NA	82.4	5.9	NA	46.5	9.4
PCB	Aroclor-1260	176	111	63.1	NA	0.211	31,273	1.00	6,569.33	6,600	NA	56.8	32.4	NA	27.5	4.6
PCB	PCB-028	6	2	33.3	NA	0.199	1.31	1.00	0.26	0.260	NA	50.0	0.0	NA	0.0	0.0
PCB	PCB-044	6	4	66.7	NA	0.199	3.06	1.00	0.61	0.610	NA	25.0	0.0	NA	0.0	0.0
PCB	PCB-052	6	5	83.3	NA	0.199	2.61	1.00	0.52	0.520	NA	20.0	0.0	NA	0.0	0.0
PCB	PCB-066	6	1	16.7	NA	0.199	2.86	1.00	0.57	0.570	NA	100.0	0.0	NA	0.0	0.0
PCB	PCB-101	6	6	100.0	NA	0.199	1.51	1.00	0.30	0.300	NA	16.7	0.0	NA1	NA1	NA1
PCB	PCB-105	6	2	33.3	NA	0.027	4.52	0.134	0.90	0.120	NA	50.0	0.0	NA	0.0	0.0
PCB	PCB-118 ^d	6	5	83.3	NA	0.027	8.29	0.134	1.64	0.220	NA	40.0	20.0	NA	0.0	0.0
PCB	PCB-138	6	6	100.0	NA	0.199	1.81	1.00	0.36	0.360	NA	33.3	0.0	NA1	NA1	NA1
PCB	PCB-153	6	6	100.0	NA	0.199	2.56	1.00	0.51	0.510	NA	33.3	0.0	NA1	NA1	NA1
PCB	PCB-156	6	2	33.3	NA	0.005	1.51	0.027	0.30	0.008	NA	100.0	0.0	NA	25.0	25.0
PCB	PCB-180	6	6	100.0	NA	0.199	3.41	1.00	0.68	0.680	NA	16.7	0.0	NA1	NA1	NA1
PCB	PCB-187	6	6	100.0	NA	0.199	5.02	1.00	1.00	1.00	NA	16.7	0.0	NA1	NA1	NA1
PCB	PCB-206 ^f	6	5	83.3	NA	0.199	6.03	1.00	1.19	1.20	NA	20.0	20.0	NA	0.0	0.0

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.
See Appendix C for full statistical analysis.

- a Chemical not selected for nature and extent evaluation based on collocation with selected chemical.
- b The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.
- c Chemical not selected for nature and extent evaluation based on the percent of detections and the low number of detections that exceeded criteria.
- d Chemical not selected for nature and extent evaluation because of PQL factor.
- e Chemical not selected for nature and extent evaluation based on maximum detection factor (maximum detect less than 30 times residential criteria).
- f PCB selection limited to Aroclor species.

bgs Below ground surface
 BHC Benzene hexachloride
 Conc. Concentration
 DDT Dichlorodiphenyltrichloroethane
 HPAL Hunters Point ambient level (for soil)
 mg/kg Milligram per kilogram
 NA Not applicable
 NA1 Not applicable; chemical detected in all samples
 PCB Polychlorinated biphenyl
 PEST Pesticide
 PQL Practical quantitation limit
 SVOC Semivolatile organic compound
 VOC Volatile organic compound

Source: Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.9-2: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-1 SOIL DATA (DEEPER THAN 10 FEET BGS)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Antimony ^a	38	10	26.3	9.05	10.2	64.6	818	0.807	660	80.0	80.0	0.0	0.0	0.0	0.0
METAL	Arsenic ^a	43	38	88.4	11.1	0.038	1,384	0.434	122	53.0	42.1	100.0	100.0	0.0	100.0	100.0
METAL	Cadmium	43	7	16.3	3.14	3.46	10.7	983	0.038	37.0	71.4	71.4	0.0	0.0	0.0	0.0
METAL	Copper ^a	43	40	93.0	124.3	159	237	75,628	0.498	37,700	22.5	22.5	0.0	0.0	0.0	0.0
METAL	Iron	43	43	100.0	NA	21,963	8.79	613,200	0.315	193,000	NA	90.7	0.0	NA1	NA1	NA1
METAL	Lead ^a	43	39	90.7	8.99	155	30.1	800	6.03	4,820	64.1	25.6	18.0	75.0	0.0	0.0
METAL	Manganese	43	43	100.0	1431.2	843	2.54	32,251	0.066	2,140	4.7	20.9	0.0	NA1	NA1	NA1
METAL	Mercury	43	17	39.5	2.28	1.59	11.9	611	0.031	19.0	5.9	11.8	0.0	0.0	0.0	0.0
METAL	Nickel ^b	43	43	100.0	48.3-2846	302	3.05	20,692	0.044	920	4.7	32.6	0.0	NA1	NA1	NA1
METAL	Vanadium	43	43	100.0	117.2	64.8	7.53	2,044	0.239	488	7.0	72.1	0.0	NA1	NA1	NA1
METAL	Zinc ^a	43	43	100.0	109.9	373	31.6	613,200	0.019	11,800	32.6	18.6	0.0	NA1	NA1	NA1
VOC	Naphthalene	45	6	13.3	NA	1.67	1.14	4.65	0.408	1.90	NA	16.7	0.0	NA	5.1	2.6
SVOC	Benzo(a)anthracene	45	5	11.1	NA	0.370	7.57	1.76	1.59	2.80	NA	20.0	20.0	NA	97.5	7.5
SVOC	Benzo(a)pyrene ^c	45	6	13.3	NA	0.037	64.3	0.176	13.7	2.40	NA	100.0	16.7	NA	100.0	100.0
SVOC	Benzo(b)fluoranthene	45	11	24.4	NA	0.338	7.98	1.76	1.54	2.70	NA	45.5	9.1	NA	100.0	5.9
SVOC	Benzo(k)fluoranthene	45	5	11.1	NA	0.338	3.84	1.76	0.740	1.30	NA	40.0	0.0	NA	100.0	7.5
SVOC	Chrysene	45	10	22.2	NA	3.30	2.48	17.6	0.467	8.20	NA	10.0	0.0	NA	0.0	0.0
PCB	Aroclor-1254	45	1	2.2	NA	0.093	11.8	1.00	1.09	1.10	NA	100.0	100.0	NA	97.7	6.8
PCB	Aroclor-1260	45	4	8.9	NA	0.211	4.74	1.00	1.00	1.00	NA	100.0	0.0	NA	70.7	4.9

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.
See Appendix C for full statistical analysis.

a Metal selection is based on samples from 0 to 10 feet bgs.

b The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

c Chemical not selected for nature and extent evaluation based on collocation with selected chemical.

bgs Below ground surface

Conc. Concentration

HPAL Hunters Point ambient level (for soil)

mg/kg Milligram per kilogram

NA Not applicable

NA1 Not applicable; chemical detected in all samples

PCB Polychlorinated biphenyl

PQL Practical quantitation limit

SVOC Semivolatile organic compound

VOC Volatile organic compound

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.9-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-1 GROUNDWATER DATA, A-AQUIFER

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Maximum Detected Concentration (µg/L)	Detects Greater than HGAL (%)	Detects Greater than Vapor Intrusion Criteria (%)	Detects Greater than Surface Water Criteria (%)	Nondetects Greater than HGAL (%)	Nondetects Greater than Vapor Intrusion Criteria (%)	Nondetects Greater than Surface Water Criteria (%)
METAL	Aluminum	56	10	17.9	NA	NA	NA	29,800	NA	NA	NA	NA	NA	NA
METAL	Antimony	53	32	60.4	43.26	NA	NA	771	37.5	NA	NA	0.0	NA	NA
METAL	Arsenic	48	23	47.9	27.34	NA	36	65.8	4.4	NA	4.4	0.0	NA	0.0
METAL	Barium	51	50	98.0	504.2	NA	NA	1,380	28.0	NA	NA	0.0	NA	NA
METAL	Beryllium	45	4	8.9	1.4	NA	NA	2.4	25.0	NA	NA	41.5	NA	NA
METAL	Cadmium	54	20	37.0	5.08	NA	8.8	113	30.0	NA	15.0	5.9	NA	5.9
METAL	Calcium	40	40	100.0	NA	NA	NA	559,000	NA	NA	NA	NA1	NA1	NA1
METAL	Chromium	57	12	21.1	15.66	NA	50	544	50.0	NA	41.7	2.2	NA	0.0
METAL	Cobalt	45	24	53.3	20.8	NA	NA	79.8	12.5	NA	NA	4.8	NA	NA
METAL	Copper	66	28	42.4	28.04	NA	3.1	19,800	42.9	NA	89.3	0.0	NA	71.1
METAL	Iron	40	25	62.5	2,380	NA	NA	100,000	24.0	NA	NA	0.0	NA	NA
METAL	Lead	60	24	40.0	14.44	NA	5.6	10,200	37.5	NA	54.2	5.6	NA	25.0
METAL	Magnesium	40	40	100.0	1,440,000	NA	NA	1,180,000	0.0	NA	NA	NA1	NA1	NA1
METAL	Manganese	45	45	100.0	8140	NA	NA	4,820	0.0	NA	NA	NA1	NA1	NA1
METAL	Mercury	58	5	8.6	0.6	NA	0.025	54	60.0	NA	100.0	0.0	NA	100.0
METAL	Molybdenum	27	19	70.4	61.9	NA	NA	157	26.3	NA	NA	0.0	NA	NA
METAL	Nickel	60	38	63.3	96.48	NA	8.2	1,720	44.7	NA	84.2	0.0	NA	54.6
METAL	Potassium	40	40	100.0	448,000	NA	NA	326,000	0.0	NA	NA	NA1	NA1	NA1
METAL	Selenium	41	3	7.3	14.5	NA	71	9.7	0.0	NA	0.0	13.2	NA	0.0
METAL	Silver	48	3	6.3	7.43	NA	0.38	68.9	33.3	NA	33.3	0.0	NA	100.0
METAL	Sodium	40	40	100.0	9,242,000	NA	NA	9,830,000	2.5	NA	NA	NA1	NA1	NA1
METAL	Thallium	44	4	9.1	12.97	NA	426	17.5	25.0	NA	0.0	17.5	NA	0.0
METAL	Vanadium	28	16	57.1	26.62	NA	NA	1,210	43.8	NA	NA	0.0	NA	NA
METAL	Zinc	63	25	39.7	75.68	NA	81	31,100	68.0	NA	68.0	15.8	NA	15.8
VOC	1,1,1-Trichloroethane	47	1	2.1	NA	3,100	6,240	0.1	NA	0.0	0.0	NA	0.0	0.0
VOC	1,2-Dichlorobenzene	47	8	17.0	NA	2,600	129	1.2	NA	0.0	0.0	NA	0.0	0.0
VOC	1,2-Dichloroethane	47	1	2.1	NA	2.3	22,600	0.23	NA	0.0	0.0	NA	45.7	0.0
VOC	1,2-Dichloroethene (total)	27	5	18.5	NA	210	44,800	2	NA	0.0	0.0	NA	0.0	0.0
VOC	1,3-Dichlorobenzene	47	5	10.6	NA	1,300	129	0.75	NA	0.0	0.0	NA	0.0	0.0
VOC	1,4-Dichlorobenzene	47	8	17.0	NA	2.1	129	2.2	NA	12.5	0.0	NA	69.2	0.0
VOC	Benzene	47	12	25.5	NA	0.37	700	5	NA	75.0	0.0	NA	100.0	0.0
VOC	Bromomethane	47	1	2.1	NA	19	6,400	0.23	NA	0.0	0.0	NA	0.0	0.0
VOC	Carbon Disulfide	35	3	8.6	NA	560	NA	18	NA	0.0	NA	NA	0.0	NA
VOC	Carbon Tetrachloride	47	1	2.1	NA	0.046	6,400	11	NA	100.0	0.0	NA	100.0	0.0
VOC	Chlorobenzene	47	11	23.4	NA	390	129	15	NA	0.0	0.0	NA	0.0	0.0
VOC	Chloromethane	47	1	2.1	NA	92	6400	0.5	NA	0.0	0.0	NA	0.0	0.0
VOC	cis-1,2-Dichloroethene	20	10	50.0	NA	210	44,800	0.94	NA	0.0	0.0	NA	0.0	0.0
VOC	Ethylbenzene	47	6	12.8	NA	3,100	86	7	NA	0.0	0.0	NA	0.0	0.0
VOC	Isopropylbenzene	6	2	33.3	NA	7.8	NA	0.17	NA	0.0	NA	NA	0.0	NA
VOC	Naphthalene	42	8	19.1	NA	3.6	470	12	NA	62.5	0.0	NA	94.1	0.0
VOC	Tetrachloroethene	47	3	6.4	NA	0.54	450	3	NA	66.7	0.0	NA	47.7	0.0

TABLE 4.3.9-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-1 GROUNDWATER DATA, A-AQUIFER (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Maximum Detected Concentration (µg/L)	Detects Greater than HGAL (%)	Detects Greater than Vapor Intrusion Criteria (%)	Detects Greater than Surface Water Criteria (%)	Nondetects Greater than HGAL (%)	Nondetects Greater than Vapor Intrusion Criteria (%)	Nondetects Greater than Surface Water Criteria (%)
VOC	Toluene	47	6	12.8	NA	1,400	5,000	1	NA	0.0	0.0	NA	0.0	0.0
VOC	trans-1,2-Dichloroethene	20	7	35.0	NA	180	44,800	0.87	NA	0.0	0.0	NA	0.0	0.0
VOC	Trichloroethene	47	7	14.9	NA	2.9	400	4	NA	14.3	0.0	NA	52.5	0.0
VOC	Vinyl Chloride	47	8	17.0	NA	0.028	NA	0.8	NA	100.0	NA	NA	100.0	NA
VOC	Xylene (total)	41	3	7.3	NA	340	NA	1	NA	0.0	NA	NA	0.0	NA
SVOC	1,2-Dichlorobenzene	3	1	33.3	NA	2,600	129	0.2	NA	0.0	0.0	NA	0.0	0.0
SVOC	1,4-Dichlorobenzene	3	1	33.3	NA	2.1	129	0.6	NA	0.0	0.0	NA	0.0	0.0
SVOC	Acenaphthene	42	3	7.1	NA	33,000	710	8	NA	0.0	0.0	NA	0.0	0.0
SVOC	Acenaphthylene	42	1	2.4	NA	NA	60	8	NA	NA	0.0	NA	NA	0.0
SVOC	Benzo(a)Anthracene	42	3	7.1	NA	NA	60	9	NA	NA	0.0	NA	NA	7.7
SVOC	Benzo(a)Pyrene	42	1	2.4	NA	NA	60	2	NA	NA	0.0	NA	NA	12.2
SVOC	Benzo(b)Fluoranthene	42	2	4.8	NA	NA	60	4	NA	NA	0.0	NA	NA	12.5
SVOC	Benzo(g,h,i)Perylene	42	1	2.4	NA	NA	60	2	NA	NA	0.0	NA	NA	12.2
SVOC	Chrysene	42	4	9.5	NA	NA	60	5	NA	NA	0.0	NA	NA	7.9
SVOC	Dibenzofuran	42	1	2.4	NA	13,000	NA	2	NA	0.0	NA	NA	0.0	NA
SVOC	Fluoranthene	42	4	9.5	NA	NA	16	3	NA	NA	0.0	NA	NA	0.0
SVOC	Indeno(1,2,3-cd)Pyrene	42	1	2.4	NA	NA	60	2	NA	NA	0.0	NA	NA	12.2
SVOC	Pentachlorophenol	39	3	7.7	NA	NA	7.9	6	NA	NA	0.0	NA	NA	58.3
SVOC	Phenol	38	8	21.1	NA	NA	1,160	18	NA	NA	0.0	NA	NA	0.0
SVOC	Pyrene	42	6	14.3	NA	230,000	60	8	NA	0.0	0.0	NA	0.0	8.3
SVOC	Total HMW PAH	42	8	19.1	NA	NA	NA	626	NA	NA	NA	NA	NA	NA
SVOC	Total LMW PAH	42	11	26.2	NA	NA	NA	90	NA	NA	NA	NA	NA	NA
SVOC	Total PAH	42	12	28.6	NA	NA	NA	976	NA	NA	NA	NA	NA	NA
PEST	4,4'-DDD	39	3	7.7	NA	NA	0.72	0.2	NA	NA	0.0	NA	NA	8.3
PEST	4,4'-DDE	39	6	15.4	NA	NA	2.8	0.8	NA	NA	0.0	NA	NA	3.0
PEST	4,4'-DDT	39	4	10.3	NA	NA	0.001	0.3	NA	NA	100.0	NA	NA	100.0
PEST	Aldrin	39	1	2.6	NA	NA	0.26	0.2	NA	NA	0.0	NA	NA	18.4
PEST	alpha-Chlordane	39	2	5.1	NA	NA	0.004	0.03	NA	NA	100.0	NA	NA	100.0
PEST	beta-BHC	39	1	2.6	NA	NA	NA	0.008	NA	NA	NA	NA	NA	NA
PEST	Dieldrin	39	4	10.3	NA	NA	0.142	0.3	NA	NA	50.0	NA	NA	22.9
PEST	Endosulfan I	39	1	2.6	NA	NA	0.0087	0.005	NA	NA	0.0	NA	NA	89.5
PEST	Endosulfan II	39	2	5.1	NA	NA	0.0087	0.4	NA	NA	50.0	NA	NA	100.0
PEST	Endosulfan Sulfate	39	1	2.6	NA	NA	NA	0.06	NA	NA	NA	NA	NA	NA
PEST	Endrin	39	2	5.1	NA	NA	0.0023	1	NA	NA	100.0	NA	NA	100.0
PEST	Endrin Aldehyde	20	3	15.0	NA	NA	NA	0.2	NA	NA	NA	NA	NA	NA
PEST	Endrin Ketone	33	1	3.0	NA	NA	NA	0.06	NA	NA	NA	NA	NA	NA
PEST	gamma-BHC (Lindane)	39	1	2.6	NA	NA	0.032	0.01	NA	NA	0.0	NA	NA	89.5
PEST	gamma-Chlordane	39	5	12.8	NA	NA	0.004	0.3	NA	NA	80.0	NA	NA	100.0
PEST	Heptachlor	39	1	2.6	NA	NA	0.0036	0.03	NA	NA	100.0	NA	NA	100.0
PEST	Heptachlor Epoxide	33	3	9.1	NA	NA	0.0036	0.2	NA	NA	100.0	NA	NA	100.0
PEST	Total Chlordane	39	5	12.8	NA	NA	NA	1.11	NA	NA	NA	NA	NA	NA

TABLE 4.3.9-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-1 GROUNDWATER DATA, A-AQUIFER (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Maximum Detected Concentration (µg/L)	Detects Greater than HGAL (%)	Detects Greater than Vapor Intrusion Criteria (%)	Detects Greater than Surface Water Criteria (%)	Nondetects Greater than HGAL (%)	Nondetects Greater than Vapor Intrusion Criteria (%)	Nondetects Greater than Surface Water Criteria (%)
PEST	Total DDT	39	7	18.0	NA	NA	NA	1.2	NA	NA	NA	NA	NA	NA
PCB	Aroclor-1242	42	1	2.4	NA	NA	0.03	2	NA	NA	100.0	NA	NA	100.0
PCB	Aroclor-1254	42	9	21.4	NA	NA	0.03	40	NA	NA	100.0	NA	NA	100.0
PCB	Aroclor-1260	42	8	19.1	NA	NA	0.03	5	NA	NA	100.0	NA	NA	100.0
PCB	Total Aroclor	42	16	38.1	NA	NA	NA	75	NA	NA	NA	NA	NA	NA
TPHEXT	Diesel-Range Organics	27	5	18.5	NA	NA	4,800	1,000	NA	NA	0.0	NA	NA	0.0
TPHPRG	Gasoline-Range Organics	27	2	7.4	NA	NA	4,800	33	NA	NA	0.0	NA	NA	0.0
TPHEXT	Motor Oil-Range Organics	6	6	100.0	NA	NA	4,800	1,500	NA	NA	0.0	NA1	NA1	NA1
TPHEXT	TPH-Extractable Unknown Hydrocarbon	11	4	36.4	NA	NA	NA	2,000	NA	NA	NA	NA	NA	NA

Notes: Data presented for all analytes detected in at least one sample.

Bold text indicates one or more detections exceeding criteria. Chemicals in bold text and shaded cells indicate one or more detections exceeding the applicable Parcel E screening criterion.

See Appendix D for full statistical analysis.

Total TPH groundwater criteria are based on distance from the shoreline and are listed in Table 4-1. The TPH plume in Redevelopment Block EOS-1 are located more than 100 feet to 150 feet from the shoreline; therefore, the total TPH groundwater criterion for Redevelopment Block EOS-1 is 4,800 µg/L.

µg/L	Microgram per liter
BHC	Benzene hexachloride
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethene
DDT	Dichlorodiphenyltrichloroethane
HGAL	Hunters Point groundwater ambient level
HMW	High molecular weight
LMW	Low molecular weight
NA	Not applicable
NA1	Not applicable; chemical detected in all samples
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PEST	Pesticide
SVOC	Semivolatile organic compound
TPH	Total petroleum hydrocarbons
TPHEXT	Total petroleum hydrocarbons - extractable
TPHPRG	Total petroleum hydrocarbons - purgeable
VOC	Volatile organic compound

TABLE 4.3.9-4: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-1 GROUNDWATER DATA, B-AQUIFER

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Unit	Number of Analyses	Number of Detections	Detections/Analyses (%)	Domestic Use Criteria (µg/L)	Surface Water Criteria (µg/L)	MCL (µg/L)	Maximum Detected Concentration (µg/L)	Ratio of Maximum Detection to Domestic Use Criteria	Ratio of Maximum Detection to Surface Water Criteria	Ratio of Maximum Detection to MCL	Detects Greater than Domestic Use Criteria (%)	Detects Greater than Surface Water Criteria (%)	Detects Greater than MCL (%)
METAL	Arsenic	µg/L	3	1	33.3	0.007	36	10	2.1	300	0.06	0.21	100.0	0.0	0.0
METAL	Barium	µg/L	3	3	100.0	7,300	NA	1,000	108	0.01	NA	0.11	0.0	NA	0.0
METAL	Cadmium	µg/L	3	1	33.3	18	8.8	5	3.2	0.18	0.36	0.64	0.0	0.0	0.0
METAL	Calcium	µg/L	6	6	100.0	NA	NA	NA	126,000	NA	NA	NA	NA	NA	NA
METAL	Iron	µg/L	6	6	100.0	11,000	NA	NA	4,760	0.43	NA	NA	0.0	NA	NA
METAL	Lead	µg/L	3	2	66.7	15	5.6	15	8.2	0.55	1.46	0.55	0.0	50.0	0.0
METAL	Magnesium	µg/L	6	6	100.0	NA	NA	NA	246,000	NA	NA	NA	NA	NA	NA
METAL	Manganese	µg/L	3	3	100.0	880	NA	NA	2,310	2.6	NA	NA	100.0	NA	NA
METAL	Molybdenum	µg/L	3	1	33.3	180	NA	NA	5	0.03	NA	NA	0.0	NA	NA
METAL	Potassium	µg/L	6	6	100.0	NA	NA	NA	99,900	NA	NA	NA	NA	NA	NA
METAL	Sodium	µg/L	6	6	100.0	NA	NA	NA	1,840,000	NA	NA	NA	NA	NA	NA
METAL	Zinc	µg/L	3	1	33.3	11,000	81	NA	7.8	0.001	0.10	NA	0.0	0.0	NA
VOC	Toluene	µg/L	9	3	33.3	720	5,000	150	0.74	0.001	0.0001	0.005	0.0	0.0	0.0
VOC	Trichlorofluoromethane	µg/L	5	1	20.0	1,300	NA	150	0.24	0.0002	NA	0.002	0.0	NA	0.0

Notes: Data presented for all analytes detected in at least one sample.

Bold text indicates one or more detections exceeding criteria. Chemicals in **bold text** and shaded cells indicate one or more detections exceeding the applicable Parcel E screening criterion.

See Appendix D for full statistical analysis.

µg/L Microgram per liter
MCL Maximum contaminant level
NA Not applicable
VOC Volatile organic compound

TABLE 4.3.10-1: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-2 SOIL DATA (0 TO 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Antimony	91	25	27.5	9.05	10.2	19.4	818	0.242	198	68.0	60.0	0.0	12.1	12.1	0.0
METAL	Arsenic	118	115	97.5	11.1	0.038	16,744	0.434	1,478	641	27.8	100.0	100.0	0.0	100.0	66.7
METAL	Cadmium	118	76	64.4	3.14	3.46	3.18	983	0.011	11.0	48.7	40.8	0.0	0.0	0.0	0.0
METAL	Copper	118	118	100.0	124.3	159	66.0	75,628	0.139	10,500	55.9	54.2	0.0	NA1	NA1	NA1
METAL	Iron	118	118	100.0	NA	21,963	7.60	613,200	0.272	167,000	NA	82.2	0.0	NA1	NA1	NA1
METAL	Lead	118	117	99.2	8.99	155	10.6	800	2.13	1,700	85.5	29.1	3.4	0.0	0.0	0.0
METAL	Manganese	118	118	100.0	1431.2	843	11.7	32,251	0.307	9,900	14.4	32.2	0.0	NA1	NA1	NA1
METAL	Mercury ^a	118	102	86.4	2.28	1.59	35.8	611	0.093	57.0	15.7	23.5	0.0	0.0	0.0	0.0
METAL	Molybdenum	118	35	29.7	2.68	76.3	19.0	10,220	0.142	1,450	88.6	25.7	0.0	6.0	0.0	0.0
METAL	Nickel ^b	118	118	100.0	30.9-5,016	302	7.28	20,692	0.106	2,200	0.0	25.4	0.0	NA1	NA1	NA1
METAL	Vanadium	118	117	99.2	117.2	64.8	4.73	2,044	0.150	307	5.1	29.9	0.0	0.0	0.0	0.0
METAL	Zinc	118	118	100.0	109.9	373	14.5	613,200	0.009	5,400	61.0	36.4	0.0	NA1	NA1	NA1
VOC	Naphthalene	81	18	22.2	NA	1.67	7.81	4.65	2.79	13	NA	33.3	11.1	NA	30.2	9.5
SVOC	Benzo(a)anthracene ^d	80	29	36.3	NA	0.370	37.9	1.76	7.97	14	NA	55.2	17.2	NA	66.7	35.3
SVOC	Benzo(a)pyrene	79	32	40.5	NA	0.037	295	0.176	62.65	11	NA	100.0	68.8	NA	100.0	74.5
SVOC	Benzo(b)fluoranthene	80	41	51.3	NA	0.338	88.7	1.76	17.09	30	NA	53.7	19.5	NA	79.5	43.6
SVOC	Benzo(k)fluoranthene ^d	79	25	31.7	NA	0.338	20.4	1.76	3.93	6.9	NA	52.0	16.0	NA	74.1	35.2
SVOC	Bis(2-ethylhexyl)phthalate	81	9	11.1	NA	1.14	34.2	176	0.221	39	NA	100.0	0.0	NA	44.4	0.0
SVOC	Chrysene	80	40	50.0	NA	3.30	5.75	17.6	1.08	19	NA	10.0	2.5	NA	27.5	0.0
SVOC	Dibenz(a,h)anthracene ^{a,e}	77	6	7.8	NA	0.058	36.3	0.289	7.28	2.1	NA	83.3	16.7	NA	98.6	74.7
SVOC	Indeno(1,2,3-cd)pyrene ^c	77	16	20.8	NA	0.347	28.2	1.76	5.58	9.8	NA	43.8	6.3	NA	73.8	39.3
SVOC	n-Nitroso-di-n-propylamine ^c	80	1	1.3	NA	0.0002	16,181	0.352	7.95	2.8	NA	100.0	100.0	NA	100.0	82.3
SVOC	n-Nitrosodiphenylamine	81	1	1.2	NA	0.679	3.54	274	0.009	2.4	NA	100.0	0.0	NA	61.3	0.0
PEST	alpha-BHC ^c	81	1	1.2	NA	0.002	28.5	0.594	0.091	0.054	NA	100.0	0.0	NA	90.0	7.5
PEST	beta-BHC	82	1	1.2	NA	0.007	1.21	2.08	0.004	0.008	NA	100.0	0.0	NA	84.0	0.0
PEST	Heptachlor Epoxide	81	1	1.2	NA	0.001	22.3	0.271	0.044	0.012	NA	100.0	0.0	NA	100.0	7.5
PCB	Aroclor-1254 ^b	121	9	7.4	NA	0.093	12.9	1.00	1.19	1.2	NA	100.0	11.1	NA	69.6	23.2
PCB	Aroclor-1260	121	72	59.5	NA	0.211	223	1.00	46.78	47	NA	76.4	27.8	NA	61.2	24.5

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceed residential screening criteria.

See Appendix C for full statistical analysis.

a Chemical not selected for nature and extent evaluation based on maximum detection factor (maximum detect less than 30 times residential criteria).

b The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

c Chemical not selected for nature and extent evaluation based on the percent of detections and the low number of detections that exceeded criteria.

d Chemical not selected for nature and extent discussion based on collocation with selected chemical.

e Chemical not selected for nature and extent evaluation based on PQL factor

bgs	Below ground surface	NA1	Not applicable; chemical detected in all samples
BHC	Benzene hexachloride	PCB	Polychlorinated biphenyl
Conc.	Concentration	PEST	Pesticide
HPAL	Hunters Point ambient level (for soil)	PQL	Practical quantitation limit
mg/kg	Milligram per kilogram	SVOC	Semivolatile organic compound
NA	Not applicable	VOC	Volatile organic compound

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.10-2: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-2 SOIL DATA (DEEPER THAN 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Antimony	36	12	33.3	9.05	10.2	30.1	818	0.377	308	41.7	41.7	0.0	20.8	20.8	0.0
METAL	Arsenic	43	43	100.0	11.1	0.038	4.336	0.434	383	166	25.6	100.0	100.0	NA	NA1	NA1
METAL	Cadmium	43	25	58.1	3.14	3.46	2.49	983	0.009	8.6	36.0	32.0	0.0	5.6	5.6	0.0
METAL	Copper	43	43	100.0	124.3	159	30.8	75,628	0.065	4,900	34.9	30.2	0.0	NA1	NA1	NA1
METAL	Iron	43	43	100.0	NA	21,963	5.87	613,200	0.210	129,000	NA	79.1	0.0	NA1	NA1	NA1
METAL	Lead	43	43	100.0	8.99	155	12.9	800	2.58	2,060	83.7	23.3	4.7	NA1	NA1	NA1
METAL	Manganese	43	43	100.0	1,431	843	3.30	32,251	0.086	2,780	9.3	20.9	0.0	NA1	NA1	NA1
METAL	Mercury	43	30	69.8	2.28	1.59	7.54	611	0.020	12	30.0	33.3	0.0	0.0	0.0	0.0
METAL	Nickel ^a	43	43	100.0	45.2-3,766	302	4.44	20,692	0.065	1,340	0.0	30.2	0.0	NA1	NA1	NA1
METAL	Vanadium	43	43	100.0	117.2	64.8	2.13	2,044	0.068	138	7.0	41.9	0.0	NA1	NA1	NA1
METAL	Zinc	43	43	100.0	109.9	373	11.0	613,200	0.007	4,120	44.2	25.6	0.0	NA1	NA1	NA1
VOC	1,4-Dichlorobenzene ^c	33	1	3.0	NA	2.01	5.96	4.54	2.64	12	NA	100.0	100.0	NA	28.1	15.6
VOC	Benzene	33	5	15.2	NA	0.179	1.06	0.389	0.489	0.19	NA	20.0	0.0	NA	0.0	0.0
VOC	Naphthalene	33	10	30.3	NA	1.67	52.8	4.65	18.9	88	NA	80.0	60.0	NA	8.7	8.7
SVOC	Benzo(a)anthracene ^b	33	2	6.1	NA	0.370	48.7	1.76	10.3	18	NA	100.0	50.0	NA	96.8	29.0
SVOC	Benzo(a)pyrene	33	4	12.1	NA	0.037	204	0.176	43.3	7.6	NA	100.0	75.0	NA	100.0	100.0
SVOC	Benzo(b)fluoranthene	33	3	9.1	NA	0.338	35.5	1.76	6.83	12	NA	100.0	33.3	NA	100.0	30.0
SVOC	Benzo(k)fluoranthene	33	2	6.1	NA	0.338	29.6	1.76	5.69	10	NA	100.0	50.0	NA	100.0	29.0
SVOC	Chrysene	33	3	9.1	NA	3.30	6.06	17.6	1.14	20	NA	33.3	33.3	NA	30.0	0.0
PCB	Aroclor-1260	44	16	36.4	NA	0.211	1,327	1.00	279	280	NA	81.3	25.0	NA	60.7	10.7

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.

See Appendix C for full statistical analysis.

a The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

b Chemical not selected for nature and extent discussion based on collocation with selected chemical.

c Chemical not selected for nature and extent evaluation based on the percent of detections and the low number of detections that exceeded criteria.

bgs Below ground surface

Conc. Concentration

HPAL Hunters Point ambient level (for soil)

mg/kg Milligram per kilogram

NA Not applicable

NA1 Not applicable; chemical detected in all samples

PCB Polychlorinated biphenyl

PQL Practical quantitation limit

SVOC Semivolatile organic compound

VOC Volatile organic compound

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.10-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-2 GROUNDWATER DATA, A-AQUIFER
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	Minimum Detection Limit	Maximum Detection Limit	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Minimum Detected Conc.	Maximum Detected Concentration (µg/L)	Detects Greater than HGAL (%)	Detects Greater than Vapor Intrusion Criteria (%)	Detects Greater than Surface Water Criteria (%)	Nondetects Greater than HGAL (%)	Nondetects Greater than Vapor Intrusion Criteria (%)	Nondetects Greater than Surface Water Criteria (%)
METAL	Aluminum	54	14	25.9	10	102	NA	NA	NA	32	37,000	NA	NA	NA	NA	NA	NA
METAL	Antimony	54	15	27.8	0.1	32	43.26	NA	NA	0.26	63.9	6.7	NA	NA	0.0	NA	NA
METAL	Arsenic	57	30	52.6	1	80	27.34	NA	36	1.9	1,180	20.0	NA	20.0	0.0	NA	0.0
METAL	Barium	59	59	100.0	0.3	50	504.2	NA	NA	47.9	19,400	64.4	NA	NA	NA1	NA1	NA1
METAL	Beryllium	55	7	12.7	0.1	2	1.4	NA	NA	0.74	3.4	71.4	NA	NA	16.7	NA	NA
METAL	Cadmium	55	5	9.1	0.2	5.5	5.08	NA	8.8	2.7	5.1	20.0	NA	0.0	2.0	NA	0.0
METAL	Calcium	51	51	100.0	8.2	200	NA	NA	NA	53000	456,000	NA	NA	NA	NA1	NA1	NA1
METAL	Chromium	57	18	31.6	0.4	5	15.66	NA	50	1	567	27.8	NA	22.2	0.0	NA	0.0
CHROM	Chromium VI	47	3	6.4	10	20	NA	NA	50	9.2	30	NA	NA	0.0	NA	NA	0.0
METAL	Cobalt	55	16	29.1	0.4	8.8	20.8	NA	NA	0.65	89.4	12.5	NA	NA	0.0	NA	NA
METAL	Copper	58	21	36.2	0.5	8.9	28.04	NA	3.1	1.4	3,240	38.1	NA	71.4	0.0	NA	54.1
METAL	Iron	51	38	74.5	5	400	2,380	NA	NA	18.3	75,400	26.3	NA	NA	0.0	NA	NA
METAL	Lead	57	19	33.3	0.02	16	14.44	NA	5.6	0.155	613	31.6	NA	42.1	0.0	NA	2.6
METAL	Magnesium	51	51	100.0	20	261	1,440,000	NA	NA	83800	984,000	0.0	NA	NA	NA1	NA1	NA1
METAL	Manganese	55	55	100.0	0.1	20	8140	NA	NA	19	3,030	0.0	NA	NA	NA1	NA1	NA1
METAL	Mercury	56	5	8.9	0.1	0.2	0.6	NA	0.025	0.19	2	60.0	NA	100.0	0.0	NA	100.0
METAL	Molybdenum	47	20	42.6	0.6	21.8	61.9	NA	NA	2.1	37.8	0.0	NA	NA	0.0	NA	NA
METAL	Nickel	57	17	29.8	0.7	28.8	96.48	NA	8.2	1.3	1,140	23.5	NA	64.7	0.0	NA	40.0
METAL	Potassium	51	51	100.0	80	5990	448,000	NA	NA	23200	489,000	2.0	NA	NA	NA1	NA1	NA1
METAL	Selenium	49	3	6.1	1	75	14.5	NA	71	3.4	32	33.3	NA	0.0	26.1	NA	2.2
METAL	Silver	55	7	12.7	0.07	7	7.43	NA	0.38	0.18	2.7	0.0	NA	85.7	0.0	NA	100.0
METAL	Sodium	51	51	100.0	18	19400	9,242,000	NA	NA	697000	9,980,000	3.9	NA	NA	NA1	NA1	NA1
METAL	Thallium	43	4	9.3	0.02	16	12.97	NA	426	0.061	3.3	0.0	NA	0.0	5.1	NA	0.0
METAL	Vanadium	47	24	51.1	0.4	19.5	26.62	NA	NA	0.98	125	29.2	NA	NA	0.0	NA	NA
METAL	Zinc	57	18	31.6	0.8	165	75.68	NA	81	2	2,400	44.4	NA	38.9	5.1	NA	5.1
VOC	1,1-Dichloroethene	62	1	1.6	0.5	10	NA	190	44,800	2	2	NA	0.0	0.0	NA	0.0	0.0
VOC	1,2-Dichlorobenzene	62	17	27.4	0.5	40	NA	2,600	129	0.19	4	NA	0.0	0.0	NA	0.0	0.0
VOC	1,2-Dichloroethane	62	4	6.5	0.5	10	NA	2.3	22,600	0.6	4	NA	50.0	0.0	NA	34.5	0.0
VOC	1,2-Dichloroethene (total)	38	6	15.8	0.5	10	NA	210	44,800	0.1	3	NA	0.0	0.0	NA	0.0	0.0
VOC	1,3-Dichlorobenzene	62	6	9.7	0.5	40	NA	1,300	129	0.13	36	NA	0.0	0.0	NA	0.0	0.0
VOC	1,4-Dichlorobenzene	61	20	32.8	0.5	40	NA	2.1	129	0.16	84	NA	35.0	0.0	NA	73.2	0.0
VOC	4-Methyl-2-Pentanone	44	4	9.1	4	20	NA	520,000	NA	4	6	NA	0.0	NA	NA	0.0	NA
VOC	Benzene	62	43	69.4	0.5	10	NA	0.37	700	0.5	13	NA	100.0	0.0	NA	100.0	0.0
VOC	Carbon Disulfide	53	7	13.2	0.5	10	NA	560	NA	0.3	24	NA	0.0	NA	NA	0.0	NA
VOC	Chlorobenzene	61	38	62.3	0.5	10	NA	390	129	0.1	150	NA	0.0	2.6	NA	0.0	0.0
VOC	cis-1,2-Dichloroethene	24	10	41.7	0.5	1	NA	210	44,800	0.15	2	NA	0.0	0.0	NA	0.0	0.0
VOC	Cyclohexane	8	6	75.0	1	1	NA	730	NA	0.24	1.6	NA	0.0	NA	NA	0.0	NA
VOC	Ethylbenzene	62	37	59.7	0.5	33	NA	3,100	86	0.13	13	NA	0.0	0.0	NA	0.0	0.0
VOC	Isopropylbenzene	11	5	45.5	1	2	NA	7.8	NA	0.3	4	NA	0.0	NA	NA	0.0	NA
VOC	m,p-Xylenes	11	3	27.3	0.5	1	NA	NA	NA	0.83	13	NA	NA	NA	NA	NA	NA
VOC	Methylcyclohexane	8	4	50.0	1	1	NA	170	NA	0.33	1.3	NA	0.0	NA	NA	0.0	NA
VOC	Naphthalene	56	33	58.9	1	50	NA	3.6	470	0.88	64	NA	87.9	0.0	NA	95.7	0.0
VOC	o-Xylene	11	5	45.5	0.5	1	NA	340	NA	0.09	21	NA	0.0	NA	NA	0.0	NA
VOC	Styrene	52	1	1.9	0.5	10	NA	9,000	NA	27	27	NA	0.0	NA	NA	0.0	NA
VOC	Tert-Butyl Methyl Ether	24	1	4.2	0.5	1	NA	390	8,000	0.4	0.4	NA	0.0	0.0	NA	0.0	0.0
VOC	Tetrachloroethene	61	7	11.5	0.5	10	NA	0.54	450	0.1	1	NA	14.3	0.0	NA	50.0	0.0
VOC	Toluene	62	30	48.4	0.5	10	NA	1,400	5,000	0.1	6	NA	0.0	0.0	NA	0.0	0.0
VOC	trans-1,2-Dichloroethene	24	2	8.3	0.5	1	NA	180	44,800	0.24	0.4	NA	0.0	0.0	NA	0.0	0.0
VOC	Trichloroethene	62	9	14.5	0.5	10	NA	2.9	400	0.12	15	NA	11.1	0.0	NA	37.7	0.0
VOC	Vinyl Chloride	62	5	8.1	0.5	20	NA	0.028	NA	0.87	2	NA	100.0	NA	NA	100.0	NA
VOC	Xylene (total)	51	34	66.7	0.5	10	NA	340	NA	0.27	32	NA	0.0	NA	NA	0.0	NA

TABLE 4.3.10-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-2 GROUNDWATER DATA, A-AQUIFER (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	Minimum Detection Limit	Maximum Detection Limit	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Minimum Detected Conc.	Maximum Detected Concentration (µg/L)	Detects Greater than HGAL (%)	Detects Greater than Vapor Intrusion Criteria (%)	Detects Greater than Surface Water Criteria (%)	Nondetects Greater than HGAL (%)	Nondetects Greater than Vapor Intrusion Criteria (%)	Nondetects Greater than Surface Water Criteria (%)
SVOC	1,4-Dichlorobenzene	1	1	100.0	1	1	NA	2.1	129	0.5	0.5	NA	0.0	0.0	NA1	NA1	NA1
SVOC	1,4-Dioxane	3	2	66.7	1	1	NA	NA	NA	2.4	3.2	NA	NA	NA	NA	NA	NA
SVOC	2,4-Dichlorophenol	59	2	3.4	1	50	NA	NA	NA	0.7	0.91	NA	NA	NA	NA	NA	NA
SVOC	2,4-Dimethylphenol	59	21	35.6	1	50	NA	NA	NA	0.5	220	NA	NA	NA	NA	NA	NA
SVOC	2-Chlorophenol	59	3	5.1	1	50	NA	1,100	NA	0.34	2	NA	0.0	NA	NA	0.0	NA
SVOC	2-Methylnaphthalene	59	33	55.9	1	50	NA	710	NA	0.1	85	NA	0.0	NA	NA	0.0	NA
SVOC	2-Methylphenol	59	16	27.1	1	50	NA	NA	NA	0.68	79	NA	NA	NA	NA	NA	NA
SVOC	4-Methylphenol	59	7	11.9	1	50	NA	NA	NA	1.9	15	NA	NA	NA	NA	NA	NA
SVOC	Acenaphthene	59	12	20.3	1	50	NA	33,000	710	0.2	22	NA	0.0	0.0	NA	0.0	0.0
SVOC	Anthracene	59	6	10.2	1	50	NA	390,000	60	2	13	NA	0.0	0.0	NA	0.0	0.0
SVOC	Benzo(a)anthracene	59	5	8.5	1	200	NA	NA	60	2	3	NA	NA	0.0	NA	NA	9.3
SVOC	Benzo(b)fluoranthene	59	1	1.7	1	200	NA	NA	60	3	3	NA	NA	0.0	NA	NA	20.7
SVOC	Carbazole	26	4	15.4	1	200	NA	NA	NA	2.5	7.4	NA	NA	NA	NA	NA	NA
SVOC	Chrysene	59	5	8.5	1	200	NA	NA	60	3	15	NA	NA	0.0	NA	NA	9.3
SVOC	Dibenzofuran	59	6	10.2	1	50	NA	13,000	NA	0.99	9	NA	0.0	NA	NA	0.0	NA
SVOC	Fluoranthene	59	3	5.1	1	50	NA	NA	16	2	12	NA	NA	0.0	NA	NA	1.8
SVOC	Fluorene	59	15	25.4	1	50	NA	44,000	60	2.7	21	NA	0.0	0.0	NA	0.0	0.0
SVOC	n-Nitrosodiphenylamine	59	1	1.7	1	50	NA	NA	660,000	7.1	7.1	NA	NA	0.0	NA	NA	0.0
SVOC	Pentachlorophenol	59	1	1.7	2	200	NA	NA	7.9	6	6	NA	NA	0.0	NA	NA	70.7
SVOC	Phenanthrene	59	22	37.3	1	50	NA	190,000	60	2	69	NA	0.0	4.6	NA	0.0	0.0
SVOC	Phenol	59	9	15.3	1	40	NA	NA	1,160	0.68	7	NA	NA	0.0	NA	NA	0.0
SVOC	Pyrene	59	9	15.3	1	200	NA	230,000	60	2	26	NA	0.0	0.0	NA	0.0	10.0
SVOC	Total HMW PAH	59	9	15.3	0	0	NA	NA	NA	80	178	NA	NA	NA	NA	NA	NA
SVOC	Total LMW PAH	59	36	61.0	0	0	NA	NA	NA	6.6	365	NA	NA	NA	NA	NA	NA
SVOC	Total PAH	59	37	62.7	0	0	NA	NA	NA	15.6	1,108	NA	NA	NA	NA	NA	NA
PEST	4,4'-DDD	42	1	2.4	0.01	20	NA	NA	0.72	0.0061	0.0061	NA	NA	0.0	NA	NA	19.5
PEST	alpha-BHC	42	1	2.4	0.005	10	NA	NA	NA	0.003	0.003	NA	NA	NA	NA	NA	NA
PEST	Endosulfan II	42	1	2.4	0.01	20	NA	NA	0.0087	0.0071	0.0071	NA	NA	0.0	NA	NA	100.0
PEST	Endrin Aldehyde	20	1	5.0	0.01	0.1	NA	NA	NA	0.009	0.009	NA	NA	NA	NA	NA	NA
PEST	Endrin Ketone	42	1	2.4	0.01	20	NA	NA	NA	0.0065	0.0065	NA	NA	NA	NA	NA	NA
PEST	gamma-BHC (Lindane)	42	1	2.4	0.005	10	NA	NA	0.032	0.03	0.03	NA	NA	0.0	NA	NA	95.1
PEST	Heptachlor Epoxide	42	1	2.4	0.005	10	NA	NA	0.0036	0.01	0.01	NA	NA	100.0	NA	NA	100.0
PEST	Total Chlordane	42	1	2.4	0	0	NA	NA	NA	0.17	0.17	NA	NA	NA	NA	NA	NA
PEST	Total DDT	42	1	2.4	0	0	NA	NA	NA	0.0561	0.0561	NA	NA	NA	NA	NA	NA
PCB	Aroclor-1254	53	2	3.8	0.1	200	NA	NA	0.03	0.2	1	NA	NA	100.0	NA	NA	100.0
PCB	Aroclor-1260	53	15	28.3	0.1	200	NA	NA	0.03	0.06	290	NA	NA	100.0	NA	NA	100.0
PCB	Total Aroclor	53	16	30.2	0	0	NA	NA	NA	0.41	640	NA	NA	NA	NA	NA	NA
TPHEXT	Diesel-Range Organics	46	21	45.7	50	38000	NA	NA	1,400	610	12,000	NA	NA	90.5	NA	NA	32.0
TPHPRG	Gasoline-Range Organics	47	23	48.9	20	500	NA	NA	1,400	46	2,000	NA	NA	4.4	NA	NA	0.0
TPHEXT	Motor-Oil-Range Organics	24	19	79.2	100	2500	NA	NA	1,400	400	16,000	NA	NA	73.7	NA	NA	0.0
TPHEXT	TPH-Extractable Unknown Hydrocarbor	19	15	79.0	50	38000	NA	NA	NA	820	560,000	NA	NA	NA	NA	NA	NA
TPHPRG	TPH-Purgeable Unknown Hydrocarbor	17	8	47.1	500	500	NA	NA	NA	700	21,000	NA	NA	NA	NA	NA	NA

TABLE 4.3.10-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-2 GROUNDWATER DATA, A-AQUIFER (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Notes: Data presented for all analytes detected in at least one sample.

Bold text indicates one or more detections exceeding criteria. Chemicals in bold text and shaded cells indicate one or more detections exceeding the applicable Parcel E screening criterion.

See Appendix D for full statistical analysis.

Total TPH groundwater criteria are based on distance from the shoreline and are listed in Table 4-1. The TPH Plume in Redevelopment Block EOS-2 is located within 50 feet of the shoreline; therefore, the total TPH groundwater criterion in this area is 1,400 µg/L.

µg/L	Microgram per liter
BHC	Benzene hexachloride
CHROM	Hexavalent chromium
Conc.	Concentration
DDD	Dichlorodiphenyldichloroethane
DDT	Dichlorodiphenyltrichloroethane
HGAL	Hunters Point groundwater ambient level
HMW	High molecular weight
LMW	Low molecular weight
NA	Not applicable
NA1	Not applicable; chemical detected in all samples
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PEST	Pesticide
SVOC	Semivolatile organic compound
TPH	Total petroleum hydrocarbons
TPHEXT	Total petroleum hydrocarbons - extractable
TPHPRG	Total petroleum hydrocarbons - purgeable
VOC	Volatile organic compound

TABLE 4.3.10-4: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-2 GROUNDWATER DATA, B-AQUIFER
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	Domestic Use Criteria (µg/L)	Surface Water Criteria (µg/L)	MCL (µg/L)	Maximum Detected Concentration (µg/L)	Ratio of Maximum Detection to Domestic Use Criteria	Ratio of Maximum Detection to Surface Water Criteria	Ratio of Maximum Detection to MCL	Detects Greater than Domestic Use Criteria (%)	Detects Greater than Surface Water Criteria (%)	Detects Greater than MCL (%)
METAL	Aluminum	8	3	37.5	36,000	NA	1,000	27	0.0008	NA	0.03	0.0	NA	0.0
METAL	Antimony	8	2	25.0	15	NA	6	2.74	0.18	NA	0.46	0.0	NA	0.0
METAL	Arsenic	8	5	62.5	0.007	36	10	6.2	886	0.17	0.62	100.0	0.0	0.0
METAL	Barium	8	8	100.0	7,300	NA	1,000	48.3	0.007	NA	0.05	0.0	NA	NA1
METAL	Cadmium	8	1	12.5	18	8.8	5	5.6	0.31	0.64	1.12	0.0	0.0	0.0
METAL	Calcium	5	5	100.0	NA	NA	NA	14,400	NA	NA	NA	NA	NA	NA1
METAL	Chromium	8	1	12.5	55,000	50	50	16.8	0.0003	0.34	0.34	0.0	0.0	0.0
METAL	Copper	8	2	25.0	1,500	3.1	1,300	6.4	0.004	2.1	0.005	0.0	100.0	0.0
METAL	Iron	5	4	80.0	11,000	NA	NA	92.8	0.01	NA	NA	0.0	NA	NA
METAL	Lead	8	3	37.5	15	5.6	15	1.9	0.13	0.34	0.13	0.0	0.0	0.0
METAL	Magnesium	5	5	100.0	NA	NA	NA	13,700	NA	NA	NA	NA	NA	NA1
METAL	Manganese	8	7	87.5	880	NA	NA	438	0.50	NA	NA	0.0	NA	NA
METAL	Nickel	8	1	12.5	730	8.2	100	4.6	0.01	0.56	0.05	0.0	0.0	0.0
METAL	Potassium	5	4	80.0	NA	NA	NA	5,820	NA	NA	NA	NA	NA	NA
METAL	Sodium	5	5	100.0	NA	NA	NA	188,000	NA	NA	NA	NA	NA	NA1
METAL	Zinc	8	4	50.0	11,000	81	NA	47.7	0.004	0.59	NA	0.0	0.0	NA
VOC	1,2,4-Trichlorobenzene	11	1	9.1	7.2	129	70	0.34	0.05	0.003	0.005	0.0	0.0	0.0
VOC	cis-1,2-Dichloroethene	8	1	12.5	61	44,800	6	0.13	0.002	0.000003	0.02	0.0	0.0	0.0
VOC	Tetrachloroethene	11	1	9.1	0.1	450	5	0.16	1.6	0.0004	0.03	100.0	0.0	0.0
VOC	Toluene	11	1	9.1	720	5,000	150	0.16	0.0002	0.00003	0.001	0.0	0.0	0.0
VOC	Trichloroethene	11	2	18.2	1.4	400	5	34	24	0.09	6.8	50.0	0.0	0.0
TPHEXT	TPH-Extractable Unknown Hydrocarbon	1	1	100.0	NA	NA	NA	51	NA	NA	NA	NA	NA	NA1

Notes: Data presented for all analytes detected in at least one sample.
Bold text indicates one or more detections exceeding criteria. Chemicals in **bold text** and shaded cells indicate one or more detections exceeding the applicable Parcel E screening criterion.
See Appendix D for full statistical analysis.

µg/L Microgram per liter
MCL Maximum contaminant level
NA Not applicable
NA1 Not applicable; chemical detected in all samples
TPH Total petroleum hydrocarbons
TPHEXT Total petroleum hydrocarbons - extractable
VOC Volatile organic compound

TABLE 4.3.11-1: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-3 SOIL DATA (0 TO 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Antimony	132	46	34.9%	9.05	10.2	23.5	818	0.294	240	58.7	54.4	0.0	7.0	7.0	0.0
METAL	Arsenic	149	113	75.8%	11.1	0.038	1,907	0.434	168	73.0	14.2	100.0	99.1	0.0	100.0	100.0
METAL	Cadium ^b	149	59	39.6%	3.14	3.46	28.9	983	0.102	100	23.7	22.0	0.0	0.0	0.0	0.0
METAL	Copper	149	145	97.3%	124.3	159	132	75,628	0.278	21,000	45.5	42.8	0.0	0.0	0.0	0.0
METAL	Iron	131	130	99.2%	NA	21,963	5.37	613,200	0.192	118,000	NA	70.0	0.0	NA	0.0	0.0
METAL	Lead	149	132	88.6%	8.99	155	38.3	800	7.66	6,130	83.3	28.0	9.9	5.9	0.0	0.0
METAL	Manganese	149	148	99.3%	1,431	843	5.48	32,251	0.143	4,620	12.2	38.5	0.0	0.0	0.0	0.0
METAL	Mercury	149	124	83.2%	2.28	1.59	11.9	611	0.031	19.0	10.5	15.3	0.0	0.0	0.0	0.0
METAL	Molybdenum	145	74	51.0%	2.68	76.3	7.34	10,220	0.055	560	43.2	2.7	0.0	7.0	0.0	0.0
METAL	Nickel ^c	148	142	96.0%	13.3-3,973	302	6.29	20,692	0.092	1,900	0.7	21.1	0.0	0.0	0.0	0.0
METAL	Vanadium ^b	149	147	98.7%	117.2	64.8	25.6	2,044	0.812	1,660	7.5	31.3	0.0	0.0	0.0	0.0
METAL	Zinc	149	146	98.0%	109.9	373	126	613,200	0.077	47,000	58.2	29.5	0.0	0.0	0.0	0.0
VOC	Naphthalene ^f	143	34	23.8%	NA	1.67	4.44	4.65	1.59	7.40	NA	17.7	14.7	NA	14.7	3.7
SVOC	Benzo(a)anthracene ^d	143	60	42.0%	NA	0.370	48.7	1.76	10.3	18.0	NA	30.0	5.0	NA	63.9	21.7
SVOC	Benzo(a)pyrene ^{d,e}	141	68	48.2%	NA	0.037	402	0.176	85.4	15.0	NA	100.0	64.7	NA	98.6	82.2
SVOC	Benzo(b)fluoranthene	143	72	50.4%	NA	0.338	35.5	1.76	6.83	12.0	NA	47.2	8.3	NA	77.5	25.4
SVOC	Benzo(k)fluoranthene ^d	141	39	27.7%	NA	0.338	41.4	1.76	7.97	14.0	NA	18.0	2.6	NA	75.5	18.6
SVOC	Bis(2-ethylhexyl)phthalate	143	20	14.0%	NA	1.14	85.8	176	0.556	98.0	NA	25.0	0.0	NA	26.8	0.0
SVOC	Chrysene ^d	143	76	53.2%	NA	3.30	5.75	17.6	1.08	19.0	NA	4.0	1.3	NA	17.9	3.0
SVOC	Dibenz(a,h)anthracene ^e	139	10	7.2%	NA	0.058	13.5	0.289	2.70	0.780	NA	90.0	50.0	NA	86.1	63.6
SVOC	Indeno(1,2,3-cd)pyrene ^d	140	36	25.7%	NA	0.347	16.7	1.76	3.30	5.80	NA	19.4	5.6	NA	63.5	18.3
PEST	Aldrin	141	2	1.4%	NA	0.024	7.47	0.145	1.24	0.180	NA	100.0	50.0	NA	11.5	0.7
PEST	alpha-BHC	141	7	5.0%	NA	0.002	7.40	0.594	0.024	0.014	NA	85.7	0.0	NA	81.3	1.5
PEST	beta-BHC ^d	141	2	1.4%	NA	0.007	12.1	2.08	0.038	0.080	NA	50.0	0.0	NA	51.8	0.0
PEST	Dieldrin	141	13	9.2%	NA	0.001	228	0.154	0.973	0.150	NA	100.0	0.0	NA	92.2	7.8
PEST	Heptachlor Epoxide ^d	141	10	7.1%	NA	0.001	279	0.271	0.553	0.150	NA	100.0	0.0	NA	92.4	1.5
PCB	Aroclor-1248	151	2	1.3%	NA	0.201	4.53	1.00	0.906	0.910	NA	100.0	0.0	NA	12.1	1.3
PCB	Aroclor-1254 ^d	151	9	6.0%	NA	0.093	15.1	1.00	1.39	1.40	NA	77.8	22.2	NA	42.3	5.6
PCB	Aroclor-1260	151	68	45.0%	NA	0.211	26.5	1.00	5.57	5.60	NA	38.2	5.9	NA	21.7	8.4
DIOXIN	1,2,3,4,6,7,8,9-OCDD	24	16	66.7%	NA	0.03602359	1.20	0.27325474	0.16	0.0434	NA	6.3	8.3	NA	0.0	0.0
DIOXIN	1,2,3,4,6,7,8-HPCDD	24	15	62.5%	NA	0.00036024	23.98	0.00273255	3.16	0.00864	NA	86.7	33.3	NA	11.1	0.0
DIOXIN	1,2,3,4,6,7,8-HPCDF	24	16	66.7%	NA	0.00036024	10.97	0.00273255	1.45	0.00395	NA	68.8	6.3	NA	12.5	0.0
DIOXIN	1,2,3,4,7,8-HxCDD	24	12	50.0%	NA	0.00003602	6.27	0.00027326	0.83	0.000226	NA	75.0	0.0	NA	58.3	8.3
DIOXIN	1,2,3,4,7,8-HxCDF	24	14	58.3%	NA	0.00003602	28.31	0.00027326	3.73	0.00102	NA	85.7	35.7	NA	60.0	10.0
DIOXIN	1,2,3,6,7,8-HxCDD	24	13	54.2%	NA	0.00003602	18.77	0.00027326	2.47	0.000676	NA	76.9	23.1	NA	72.7	9.1
DIOXIN	1,2,3,6,7,8-HxCDF	24	13	54.2%	NA	0.00003602	26.73	0.00027326	3.52	0.000963	NA	92.3	30.8	NA	45.5	9.1
DIOXIN	1,2,3,7,8,9-HxCDD	24	12	50.0%	NA	0.00003602	17.54	0.00027326	2.31	0.000632	NA	83.3	25.0	NA	58.3	8.3
DIOXIN	1,2,3,7,8,9-HxCDF	24	12	50.0%	NA	0.00003602	5.86	0.00027326	0.77	0.000211	NA	50.0	0.0	NA	66.7	8.3
DIOXIN	1,2,3,7,8-PECDD	24	12	50.0%	NA	0.0000036	69.41	0.00002733	9.15	0.00025	NA	100.0	83.3	NA	66.7	66.7
DIOXIN	1,2,3,7,8-PECDF	24	12	50.0%	NA	0.0001	10.1	0.001	1.33	0.001	NA	83.3	8.3	NA	25.0	0.0
DIOXIN	2,3,4,6,7,8-HxCDF	24	13	54.2%	NA	0.00004	34.7	0.0003	4.57	0.001	NA	92.3	46.2	NA	54.6	9.1
DIOXIN	2,3,4,7,8-PECDF ^a	24	13	54.2%	NA	0.00001	183	0.0001	24.2	0.001	NA	92.3	92.3	NA	72.7	63.6
DIOXIN	2,3,7,8-TCDD	24	12	50.0%	NA	0.000004	17.6	0.00003	2.32	0.0001	NA	91.7	25.0	NA	66.7	66.7
DIOXIN	2,3,7,8-TCDF	24	14	58.3%	NA	0.00004	18.8	0.0003	2.48	0.001	NA	78.6	14.3	NA	80.0	10.0

TABLE 4.3.11-1: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-3 SOIL DATA (0 TO 10 FEET BGS) (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.
See Appendix C for full statistical analysis.

- a 2,3,4,7,8-PECDF was selected to represent dioxins/furans because it has the largest number of sample concentrations that exceeded the industrial criteria.
- b Chemical not selected for nature and extent evaluation based on maximum detection factor (maximum detect less than 30 times residential criteria).
- c The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.
- d Chemical not selected for nature and extent discussion based on collocation with selected chemical.
- e Chemical not selected for nature and extent evaluation based on PQL factor.
- f Chemical not selected for nature and extent evaluation based on the percent of detections and the low number of detections that exceeded criteria.

bgs Below ground surface
BHC Benzene hexachloride
Conc. Concentration
HPAL Hunters Point ambient level (for soil)
HPCDD Heptachlorodibenzo-p-dioxin
HPCDF Heptachlorodibenzofuran
HXCDD Hexachlorodibenzo-p-dioxin
HXCDF Hexachlorodibenzofuran
mg/kg Milligram per kilogram
NA Not applicable
OCDD Octachlorodibenzo-p-dioxin
PCB Polychlorinated biphenyl
PECDD Pentachlorodibenzo-p-dioxin
PECDF Pentachlorodibenzofuran
PEST Pesticide
PQL Practical quantitation limit
SVOC Semivolatile organic compound
TCDD Tetrachlorodibenzo-p-dioxin
TCDF Tetrachlorodibenzofuran
VOC Volatile organic compound

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.11-2: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-3 SOIL DATA (DEEPER THAN 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Antimony	46	16	34.8	9.05	10.2	5.77	818	0.072	59.00	56.3	56.3	0.0	16.7	10.0	0.0
METAL	Arsenic ^b	61	60	98.4	11.1	0.038	378.8	0.434	33.43	14.50	6.7	100.0	100.0	0.0	100.0	100.0
METAL	Cadmium	61	7	11.5	3.14	3.46	4.86	983	0.017	16.80	28.6	28.6	0.0	1.9	1.9	0.0
METAL	Copper ^b	61	59	96.7	124.3	159	21.2	75,628	0.045	3,370.00	15.3	15.3	0.0	0.0	0.0	0.0
METAL	Iron	56	56	100.0	NA	21,963	2.07	613,200	0.074	45,500.00	NA	53.6	0.0	NA1	NA1	NA1
METAL	Lead ^b	61	55	90.2	8.99	155	5.63	800	1.13	900.00	50.9	10.9	1.8	0.0	0.0	0.0
METAL	Manganese	61	61	100.0	1,431	843	3.45	32,251	0.090	2,910.00	1.6	3.3	0.0	NA1	NA1	NA1
METAL	Mercury	61	26	42.6	2.28	1.59	4.96	611	0.013	7.90	3.9	3.9	0.0	0.0	0.0	0.0
METAL	Nickel ^c	61	55	90.2	41.2-1,384	302	1.45	20,692	0.021	439.00	0.0	3.6	0.0	0.0	0.0	0.0
METAL	Vanadium	61	61	100.0	117	64.8	3.86	2,044	0.122	250.00	3.3	32.8	0.0	NA1	NA1	NA1
METAL	Zinc	61	60	98.4	110	373	6.08	613,200	0.004	2,270.00	16.7	10.0	0.0	0.0	0.0	0.0
SVOC	Benzo(a)anthracene	52	22	42.3	NA	0.370	7.84	1.76	1.65	2.90	NA	27.3	4.6	NA	96.7	0.0
SVOC	Benzo(a)pyrene ^{d,e}	52	21	40.4	NA	0.037	77.7	0.176	16.5	2.90	NA	100.0	81.0	NA	96.8	96.8
SVOC	Benzo(b)fluoranthene	52	22	42.3	NA	0.338	8.57	1.76	1.65	2.90	NA	31.8	4.6	NA	96.7	0.0
SVOC	Benzo(k)fluoranthene	52	18	34.6	NA	0.338	2.93	1.76	0.564	0.99	NA	11.1	0.0	NA	97.1	0.0
SVOC	Dibenz(a,h)anthracene	52	2	3.9	NA	0.058	3.63	0.289	0.728	0.21	NA	100.0	0.0	NA	90.0	90.0
SVOC	Indeno(1,2,3-cd)pyrene	52	16	30.8	NA	0.347	5.47	1.76	1.08	1.90	NA	25.0	6.3	NA	91.7	0.0
PEST	Dieldrin	52	2	3.9	NA	0.001	72.8	0.154	0.311	0.05	NA	100.0	0.0	NA	94.0	0.0
PEST	Heptachlor Epoxide ^d	52	3	5.8	NA	0.001	50.1	0.271	0.100	0.03	NA	100.0	0.0	NA	95.9	0.0
PCB	Aroclor-1254 ^d	61	1	1.6	NA	0.093	12.9	1.00	1.19	1.20	NA	100.0	100.0	NA	78.3	1.7
PCB	Aroclor-1260	61	8	13.1	NA	0.211	1.28	1.00	0.269	0.27	NA	12.5	0.0	NA	49.1	1.9
PEST	alpha-BHC	52	1	1.9	NA	0.002	1.16	0.594	0.004	0.00	NA	100.0	0.0	NA	92.2	0.0
DIOXIN	1,2,3,4,6,7,8-HPCDD	3	3	100.0	NA	0.0004	2.80	0.003	0.370	0.00	NA	100.0	0.0	NA1	NA1	NA1
DIOXIN	1,2,3,4,6,7,8-HPCDF	3	3	100.0	NA	0.0004	2.83	0.003	0.373	0.00	NA	66.7	0.0	NA1	NA1	NA1
DIOXIN	1,2,3,4,7,8-HXCDD	3	3	100.0	NA	0.00004	1.45	0.0003	0.191	0.00	NA	33.3	0.0	NA1	NA1	NA1
DIOXIN	1,2,3,4,7,8-HXCDF	3	3	100.0	NA	0.00004	9.74	0.0003	1.28	0.00	NA	100.0	33.3	NA1	NA1	NA1
DIOXIN	1,2,3,6,7,8-HXCDD	3	3	100.0	NA	0.00004	2.49	0.0003	0.328	0.00	NA	100.0	0.0	NA1	NA1	NA1
DIOXIN	1,2,3,6,7,8-HXCDF	3	3	100.0	NA	0.00004	8.74	0.0003	1.15	0.00	NA	100.0	33.3	NA1	NA1	NA1
DIOXIN	1,2,3,7,8,9-HXCDD	3	3	100.0	NA	0.00004	2.01	0.0003	0.265	0.00	NA	100.0	0.0	NA1	NA1	NA1
DIOXIN	1,2,3,7,8,9-HXCDF	3	3	100.0	NA	0.00004	2.10	0.0003	0.277	0.00	NA	33.3	0.0	NA1	NA1	NA1
DIOXIN	1,2,3,7,8-PECDD	3	3	100.0	NA	0.000004	15.9	0.00003	2.10	0.00	NA	100.0	33.3	NA1	NA1	NA1
DIOXIN	1,2,3,7,8-PECDF	3	3	100.0	NA	0.0001	2.91	0.001	0.384	0.00	NA	33.3	0.0	NA1	NA1	NA1
DIOXIN	2,3,4,6,7,8-HXCDF	3	3	100.0	NA	0.00004	11.5	0.0003	1.52	0.00	NA	100.0	33.3	NA1	NA1	NA1
DIOXIN	2,3,4,7,8-PECDF ^a	3	3	100.0	NA	0.00001	58.6	0.0001	7.72	0.00	NA	100.0	100.0	NA1	NA1	NA1
DIOXIN	2,3,7,8-TCDD	3	3	100.0	NA	0.000004	4.00	0.00003	0.527	0.00	NA	100.0	0.0	NA1	NA1	NA1
DIOXIN	2,3,7,8-TCDF	3	3	100.0	NA	0.00004	5.94	0.0003	0.783	0.00	NA	100.0	0.0	NA1	NA1	NA1

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.

See Appendix C for full statistical analysis.

a 2,3,4,7,8-PECDF was selected to represent dioxins/furans because it has the largest number of sample concentrations that exceeded the industrial criteria.

b Metal selection is based on samples from 0 to feet bgs.

c The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

d Chemical not selected for nature and extent discussion based on collocation with selected chemical.

e Chemical not selected for nature and extent evaluation based on PQL factor

bgs	Below ground surface	HXCDF	Hexachlorodibenzofuran	PECDF	Pentachlorodibenzofuran
BHC	Benzene hexachloride	mg/kg	Milligram per kilogram	PEST	Pesticide
Conc.	Concentration	NA	Not applicable	PQL	Practical quantitation limit
HPAL	Hunters Point ambient level (for soil)	NA1	Not applicable; chemical detected in all samples	SVOC	Semivolatile organic compound
HPCDD	Heptachlorodibenzo-p-dioxin	PCB	Polychlorinated biphenyl	TCDD	Tetrachlorodibenzo-p-dioxin
HPCDF	Heptachlorodibenzofuran	PECDD	Pentachlorodibenzo-p-dioxin	TCDF	Tetrachlorodibenzofuran
HXCDD	Hexachlorodibenzo-p-dioxin				

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.11-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-3 GROUNDWATER DATA, A-AQUIFER

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Maximum Detected Concentration (µg/L)	Detects Greater than HGAL (%)	Detects Greater than Vapor Intrusion Criteria (%)	Detects Greater than Surface Water Criteria (%)	Nondetects Greater than HGAL (%)	Nondetects Greater than Vapor Intrusion Criteria (%)	Nondetects Greater than Surface Water Criteria (%)
METAL	Aluminum	36	5	13.9	NA	NA	NA	1710	NA	NA	NA	NA	NA	NA
METAL	Antimony	34	15	44.1	43.26	NA	NA	61.8	20.0	NA	NA	0.0	NA	NA
METAL	Arsenic	35	9	25.7	27.34	NA	NA	13.7	0.0	NA	0.0	11.5	NA	11.5
METAL	Barium	35	35	100.0	504.2	NA	NA	139	0.0	NA	NA	NA1	NA1	NA1
METAL	Beryllium	35	1	2.9	1.4	NA	NA	3	100.0	NA	NA	26.5	NA	NA
METAL	Cadmium	35	9	25.7	5.08	NA	NA	8.3	11.1	NA	0.0	11.5	NA	11.5
METAL	Calcium	27	27	100.0	NA	NA	NA	379,000	NA	NA	NA	NA1	NA1	NA1
METAL	Chromium	35	2	5.7	15.66	NA	50	5.9	0.0	NA	0.0	9.1	NA	0.0
METAL	Cobalt	35	5	14.3	20.8	NA	NA	12.7	0.0	NA	NA	6.7	NA	NA
METAL	Copper	36	14	38.9	28.04	NA	3.1	114	42.9	NA	71.4	0.0	NA	77.3
METAL	Iron	27	17	63.0	2380	NA	NA	30,100	29.4	NA	NA	0.0	NA	NA
METAL	Lead	35	10	28.6	14.44	NA	5.6	11.9	0.0	NA	10.0	24.0	NA	40.0
METAL	Magnesium	27	27	100.0	1,440,000	NA	NA	1,200,000	0.0	NA	NA	NA1	NA1	NA1
METAL	Manganese	35	33	94.3	8140	NA	NA	2140	0.0	NA	NA	0.0	NA	NA
METAL	Mercury	35	1	2.9	0.6	NA	0.025	0.28	0.0	NA	100.0	0.0	NA	100.0
METAL	Molybdenum	26	13	50.0	61.9	NA	NA	15.1	0.0	NA	NA	0.0	NA	NA
METAL	Nickel	39	11	28.2	96.48	NA	8.2	3430	9.1	NA	100.0	0.0	NA	75.0
METAL	Potassium	27	27	100.0	448,000	NA	NA	410,000	0.0	NA	NA	NA1	NA1	NA1
METAL	Selenium	24	2	8.3	14.5	NA	71	25.5	100.0	NA	0.0	18.2	NA	0.0
METAL	Silver	35	2	5.7	7.43	NA	0.38	7.5	50.0	NA	100.0	0.0	NA	100.0
METAL	Sodium	27	27	100.0	9,242,000	NA	NA	10,200,000	33.3	NA	NA	NA1	NA1	NA1
METAL	Vanadium	26	10	38.5	26.62	NA	NA	146	50.0	NA	NA	0.0	NA	NA
METAL	Zinc	36	9	25.0	75.68	NA	81	182	88.9	NA	88.9	11.1	NA	11.1
VOC	1,2-Dichloroethane	36	1	2.8	NA	2.3	22,600	1	NA	0.0	0.0	NA	45.7	0.0
VOC	Bromomethane	36	2	5.6	NA	19	6,400	0.32	NA	0.0	0.0	NA	0.0	0.0
VOC	Carbon Disulfide	30	4	13.3	NA	560	NA	12	NA	0.0	NA	NA	0.0	NA
VOC	Chloroform	36	1	2.8	NA	0.7	6,400	2	NA	100.0	0.0	NA	57.1	0.0
VOC	Tetrachloroethene	36	2	5.6	NA	0.54	450	6	NA	100.0	0.0	NA	55.9	0.0
SVOC	2-Methylnaphthalene	27	1	3.7	NA	710	NA	3	NA	0.0	NA	NA	0.0	NA
SVOC	Phenol	26	1	3.9	NA	NA	1160	0.6	NA	NA	0.0	NA	NA	0.0
SVOC	Total LMW PAH	27	1	3.7	NA	NA	NA	66	NA	NA	NA	NA	NA	NA
SVOC	Total PAH	27	1	3.7	NA	NA	NA	156	NA	NA	NA	NA	NA	NA
PEST	4,4'-DDD	25	1	4.0	NA	NA	0.72	0.015	NA	NA	0.0	NA	NA	4.2
PEST	4,4'-DDE	25	3	12.0	NA	NA	2.8	0.2	NA	NA	0.0	NA	NA	0.0
PEST	4,4'-DDT	25	1	4.0	NA	NA	0.001	0.016	NA	NA	100.0	NA	NA	100.0
PEST	alpha-Chlordane	25	1	4.0	NA	NA	0.004	0.013	NA	NA	100.0	NA	NA	100.0
PEST	delta-BHC	25	1	4.0	NA	NA	NA	0.005	NA	NA	NA	NA	NA	NA
PEST	Dieldrin	25	1	4.0	NA	NA	0.142	0.017	NA	NA	0.0	NA	NA	4.2
PEST	Endosulfan I	25	1	4.0	NA	NA	0.0087	0.017	NA	NA	100.0	NA	NA	91.7
PEST	Endosulfan II	25	1	4.0	NA	NA	0.0087	0.014	NA	NA	100.0	NA	NA	100.0
PEST	Endosulfan Sulfate	25	1	4.0	NA	NA	NA	0.012	NA	NA	NA	NA	NA	NA
PEST	Endrin	25	1	4.0	NA	NA	0.0023	0.018	NA	NA	100.0	NA	NA	100.0

TABLE 4.3.11-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-3 GROUNDWATER DATA, A-AQUIFER (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	HGAL (µg/L)	Vapor Intrusion Criteria (µg/L)	Surface Water Criteria (µg/L)	Maximum Detected Concentration (µg/L)	Detects Greater than HGAL (%)	Detects Greater than Vapor Intrusion Criteria (%)	Detects Greater than Surface Water Criteria (%)	Nondetects Greater than HGAL (%)	Nondetects Greater than Vapor Intrusion Criteria (%)	Nondetects Greater than Surface Water Criteria (%)
PEST	Endrin Ketone	23	1	4.4	NA	NA	NA	0.012	NA	NA	NA	NA	NA	NA
PEST	gamma-Chlordane	25	1	4.0	NA	NA	0.004	0.013	NA	NA	100.0	NA	NA	100.0
PEST	Heptachlor Epoxide	23	1	4.4	NA	NA	0.0036	0.014	NA	NA	100.0	NA	NA	100.0
PEST	Methoxychlor	25	1	4.0	NA	NA	0.003	0.015	NA	NA	100.0	NA	NA	100.0
PEST	Total Chlordane	25	1	4.0	NA	NA	NA	0.13	NA	NA	NA	NA	NA	NA
PEST	Total DDT	25	3	12.0	NA	NA	NA	0.3	NA	NA	NA	NA	NA	NA
PCB	Aroclor-1260	32	1	3.1	NA	NA	0.03	0.8	NA	NA	100.0	NA	NA	100.0
PCB	Total Aroclor	32	1	3.1	NA	NA	NA	2.55	NA	NA	NA	NA	NA	NA
TPHEXT	Diesel-Range Organics	18	1	5.6	NA	NA	2,100	61	NA	NA	0.0	NA	NA	0.0
TPHEXT	Motor Oil-Range Organics	1	1	100.0	NA	NA	2,100	210	NA	NA	0.0	NA1	NA1	NA1
TPHEXT	TPH-Extractable Unknown Hydrocarbon	10	1	10.0	NA	NA	NA	110	NA	NA	NA	NA	NA	NA

Notes: Data presented for all analytes detected in at least one sample.

Bold text indicates one or more detections exceeding criteria. Chemicals in bold text and shaded cells indicate one or more detections exceeding the applicable Parcel E screening criterion.

See Appendix D for full statistical analysis.

Total TPH groundwater criteria are based on distance from the shoreline and are listed in Table 4-1. Wells in Redevelopment Block EOS-3 are located more than 50 feet from and within 100 feet of the shoreline; therefore, the total TPH groundwater criterion for Redevelopment Block EOS-3 is 2,100 µg/L.

µg/L	Microgram per liter
BHC	Benzene hexachloride
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethene
DDT	Dichlorodiphenyltrichloroethane
HGAL	Hunters Point groundwater ambient level
LMW	Low molecular weight
NA	Not applicable
NA1	Not applicable; chemical detected in all samples
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated Biphenyls
PEST	Pesticide
SVOC	Semivolatile organic compound
TPH	Total petroleum hydrocarbons
TPHEXT	Total petroleum hydrocarbons - extractable
VOC	Volatile organic compound

TABLE 4.3.11-4: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-3 GROUNDWATER DATA, B-AQUIFER
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Detections/Analyses (%)	Domestic Use Criteria (µg/L)	Surface Water Criteria (µg/L)	MCL (µg/L)	Maximum Detected Concentration (µg/L)	Ratio of Maximum Detection to Domestic Use Criteria	Ratio of Maximum Detection to Surface Water Criteria	Ratio of Maximum Detection to MCL	Detects Greater than Domestic Use Criteria (%)	Detects Greater than Surface Water Criteria (%)	Detects Greater than MCL (%)
METAL	Arsenic	3	3	100.0	0.007	36	10	5.2	743	0.14	0.52	100.0	0.0	0.0
METAL	Barium	3	3	100.0	7,300	NA	1,000	77.1	0.01	NA	0.08	0.0	NA	0.0
METAL	Cadmium	3	1	33.3	18	8.8	5	2.9	0.16	0.33	0.58	0.0	0.0	0.0
METAL	Calcium	3	3	100.0	NA	NA	NA	928,000	NA	NA	NA	NA	NA	NA
METAL	Chromium	3	1	33.3	55,000	50	50	10.3	0.0002	0.21	0.21	0.0	0.0	0.0
METAL	Copper	3	1	33.3	1,500	3.1	1,300	4.7	0.003	1.5	0.004	0.0	100.0	0.0
METAL	Iron	3	1	33.3	11,000	NA	NA	239	0.02	NA	NA	0.0	NA	NA
METAL	Magnesium	3	3	100.0	NA	NA	NA	980,000	NA	NA	NA	NA	NA	NA
METAL	Manganese	3	3	100.0	880	NA	NA	2,220	2.5	NA	NA	66.7	NA	NA
METAL	Molybdenum	3	3	100.0	180	NA	NA	86	0.48	NA	NA	0.0	NA	NA
METAL	Potassium	3	3	100.0	NA	NA	NA	239,000	NA	NA	NA	NA	NA	NA
METAL	Sodium	3	3	100.0	NA	NA	NA	6,500,000	NA	NA	NA	NA	NA	NA
METAL	Vanadium	3	2	66.7	36	NA	NA	8.2	0.23	NA	NA	0.0	NA	NA
VOC	Ethylbenzene	6	1	16.7	1,300	86	700	2	0.002	0.02	0.003	0.0	0.0	0.0
VOC	Toluene	6	1	16.7	720	5,000	150	2	0.003	0.0004	0.01	0.0	0.0	0.0
VOC	Xylene (Total)	4	1	25.0	210	NA	1750	13	0.06	NA	0.007	0.0	NA	0.0

Notes: Data presented for all analytes detected in at least one sample.
Bold text indicates one or more detections exceeding criteria. Chemicals in **bold** text and shaded cells indicate one or more detections exceeding the applicable Parcel E screening criterion.
See Appendix D for full statistical analysis.

µg/L Microgram per liter
MCL Maximum contaminant level
NA Not applicable
VOC Volatile organic compound

TABLE 4.3.12-1: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-4 SOIL DATA (0 TO 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Arsenic ^a	2	1	50.0	11.1	0.038	141	0.434	12.5	5.40	0.0	100.0	100.0	0.0	100.0	100.0
METAL	Iron	2	2	100.0	NA	21,963	1.93	613,200	0.069	42,300	NA	100.0	0.0	NA1	NA1	NA1
METAL	Nickel ^b	2	2	100.0	669-4,034	302	5.30	20,692	0.077	1,600	0.0	50.0	0.0	NA1	NA1	NA1
METAL	Vanadium	2	2	100.0	117.2	64.8	1.17	2,044	0.037	75.8	0.0	50.0	0.0	NA1	NA1	NA1

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.
See Appendix C for full statistical analysis.

a Chemical not selected for nature and extent evaluation based on HPAL factor.

b The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

bgs Below ground surface

Conc. Concentration

HPAL Hunters Point ambient level (for soil)

mg/kg Milligram per kilogram

NA Not applicable

NA1 Not applicable; chemical detected in all samples

PQL Practical quantitation limit

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.13-1: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-5 SOIL DATA (0 TO 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Parcel E Residential Screening Criteria (mg/kg)	Ratio of Maximum Detected to Residential Criteria	Parcel E Industrial Screening Criteria (mg/kg)	Ratio of Maximum Detected to Industrial Criteria	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than Residential Criteria (%)	Detects Greater than Industrial Criteria (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than Residential Criteria (%)	Nondetects Greater than Industrial Criteria (%)
METAL	Arsenic ^a	39	34	87.2	11.1	0.038	334	0.434	29.5	12.8	2.9	100.0	100.0	0.0	100.0	100.0
METAL	Cadmium	39	31	79.5	3.14	3.46	1.16	983	0.004	4.00	3.2	3.2	0.0	0.0	0.0	0.0
METAL	Copper ^a	39	37	94.9	124.3	159	89.8	75,628	0.189	14,300	8.1	5.4	0.0	0.0	0.0	0.0
METAL	Iron	39	39	100.0	NA	21,963	1.92	613,200	0.069	42,200	NA	76.9	0.0	NA1	NA1	NA1
METAL	Lead	39	39	100.0	8.99	155	8.00	800	1.60	1,280	48.7	7.7	2.6	NA1	NA1	NA1
METAL	Mercury	39	24	61.5	2.28	1.59	2.77	611	0.007	4.40	4.2	4.2	0.0	0.0	0.0	0.0
METAL	Nickel ^b	39	39	100.0	65.8-2,572	302	1.98	20,692	0.029	598	0.0	5.1	0.0	NA1	NA1	NA1
METAL	Zinc	39	39	100.0	109.9	373	1.55	613,200	0.001	580	23.1	7.7	0.0	NA1	NA1	NA1
SVOC	Benzo(a)anthracene	39	3	7.7	NA	0.370	23.8	1.76	5.01	8.80	NA	33.3	33.3	NA	44.4	16.7
SVOC	Benzo(a)pyrene ^{a,c}	39	4	10.3	NA	0.037	348	0.176	74.0	13.0	NA	100.0	50.0	NA	100.0	100.0
SVOC	Benzo(b)fluoranthene ^a	39	3	7.7	NA	0.338	62.1	1.76	12.0	21.0	NA	33.3	33.3	NA	100.0	16.7
SVOC	Benzo(k)fluoranthene	39	2	5.1	NA	0.338	10.3	1.76	1.99	3.50	NA	50.0	50.0	NA	100.0	16.2
SVOC	Chrysene	39	4	10.3	NA	3.30	1.82	17.6	0.342	6.00	NA	25.0	0.0	NA	14.3	8.6
SVOC	Dibenz(a,h)anthracene ^{a,c}	39	2	5.1	NA	0.058	29.4	0.289	5.89	1.70	NA	100.0	50.0	NA	100.0	100.0
SVOC	Indeno(1,2,3-cd)pyrene	39	4	10.3	NA	0.347	15.0	1.76	2.96	5.20	NA	25.0	25.0	NA	88.6	17.1
PEST	Dieldrin	37	1	2.7	NA	0.001	3.03	0.154	0.013	0.002	NA	100.0	0.0	NA	100.0	0.0

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceeded residential screening criteria.
See Appendix C for full statistical analysis.

^a Chemical not selected for nature and extent evaluation based on the percent of detections and the low number of detections exceeding criteria.

^b The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

^c Chemical not selected for nature and extent evaluation based on PQL factor

bgs Below ground surface

Conc. Concentration

HPAL Hunters Point ambient level (for soil)

mg/kg Milligram per kilogram

NA Not applicable

NA1 Not applicable; chemical detected in all samples

PEST Pesticides

PQL Practical quantitation limit

SVOC Semivolatile organic compound

Source:

Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.14-1: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-1 SEDIMENT DATA (0 TO 10 FEET BGS)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Ratio of Maximum Detected to HPAL	ER-M (mg/kg)	Ratio of Maximum Detected to ER-M	San Francisco Bay Sediment Ambient	Ratio of Maximum Detected to San Francisco Bay Sediment Ambient	PSC	Ratio of Maximum Detected to PSC	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than ER-M (%)	Detects Greater than San Francisco Bay Sediment Ambient (%)	Detects Greater than PSC (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than ER-M (%)	Nondetects Greater than San Francisco Bay Sediment Ambient (%)	Nondetects Greater than PSC (%)
CHROM	Chromium VI	4	1	25.00%	NA	NA	NA	NA	NA	NA	NA	NA	0.16	NA	NA	NA	NA	NA	NA	NA	NA
METAL	Aluminum	9	9	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	4900	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Antimony	9	5	55.56%	9.05	3.20442	25	1.16	NA	NA	NA	NA	29	60.00%	20.00%	NA	NA	0.00%	0.00%	NA	NA
METAL	Arsenic	9	9	100.00%	11.1	0.990991	70	0.157143	15.3	0.71895425	NA	NA	11	0.00%	0.00%	0.00%	NA	All Detected	All Detected	All Detected	All Detected
METAL	Barium	9	9	100.00%	314.4	0.349873	NA	NA	NA	NA	NA	NA	110	0.00%	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Beryllium	9	6	66.67%	0.71	0.422535	NA	NA	NA	NA	NA	NA	0.3	0.00%	NA	NA	NA	0.00%	NA	NA	NA
METAL	Cadmium	9	9	100.00%	3.14	4.140127	9.6	1.354167	0.33	39.39393939	4.24	3.066038	13	55.56%	11.11%	100.00%	44.44%	All Detected	All Detected	All Detected	All Detected
METAL	Calcium	9	9	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	100000	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Chromium	9	9	100.00%	NA	NA	370	0.783784	112	2.58928571	NA	NA	290	NA	0.00%	44.44%	NA	All Detected	All Detected	All Detected	All Detected
METAL	Cobalt	9	9	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	16	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Copper	4	4	100.00%	124.3	13.67659	270	6.296296	68.1	24.96328928	1083.7	1.5687	1700	100.00%	75.00%	100.00%	25.00%	All Detected	All Detected	All Detected	All Detected
METAL	Iron	9	9	100.00%	58000	1.206897	NA	NA	NA	NA	NA	NA	70000	11.11%	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Lead	4	4	100.00%	8.99	66.74082	218	2.752294	43.2	13.88888889	441.9	1.357773	600	100.00%	25.00%	100.00%	25.00%	All Detected	All Detected	All Detected	All Detected
METAL	Magnesium	9	9	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	50000	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Manganese	9	9	100.00%	1431.2	0.363331	NA	NA	NA	NA	NA	NA	520	0.00%	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Mercury	9	9	100.00%	2.28	10.52632	0.71	33.80282	0.43	55.81395349	NA	NA	24	33.33%	55.56%	77.78%	NA	All Detected	All Detected	All Detected	All Detected
METAL	Molybdenum	9	3	33.33%	2.68	3.022388	NA	NA	NA	NA	NA	NA	8.1	66.67%	NA	NA	NA	0.00%	NA	NA	NA
METAL	Nickel	9	9	100.00%	NA	NA	51.6	5.620155	112	2.58928571	1941.4	0.149377	290	NA	88.89%	66.67%	0.00%	All Detected	All Detected	All Detected	All Detected
METAL	Potassium	9	7	77.78%	NA	NA	NA	NA	NA	NA	NA	NA	850	NA	NA	NA	NA	NA	NA	NA	NA
METAL	Selenium	9	1	11.11%	1.95	1.128205	NA	NA	0.64	3.4375	1.95	1.128205	2.2	100.00%	NA	100.00%	100.00%	0.00%	NA	0.00%	0.00%
METAL	Silver	9	4	44.44%	1.43	0.909091	3.7	0.351351	0.58	2.24137931	NA	NA	1.3	0.00%	0.00%	25.00%	NA	0.00%	0.00%	0.00%	NA
METAL	Sodium	9	9	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	3400	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Vanadium	9	9	100.00%	117.2	0.776451	NA	NA	NA	NA	NA	NA	91	0.00%	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Zinc	4	4	100.00%	109.9	8.644222	410	2.317073	158	6.01265823	719.3	1.320728	950	100.00%	75.00%	75.00%	25.00%	All Detected	All Detected	All Detected	All Detected
SVOC	Anthracene	9	2	22.22%	NA	NA	1.1	0.181818	0.088	2.27272727	NA	NA	0.2	NA	0.00%	100.00%	NA	NA	0.00%	100.00%	NA
SVOC	Benzo(a)anthracene	9	5	55.56%	NA	NA	1.6	0.6875	0.244	4.50819672	NA	NA	1.1	NA	0.00%	80.00%	NA	NA	0.00%	0.00%	NA
SVOC	Benzo(a)pyrene	9	5	55.56%	NA	NA	1.6	0.625	0.412	2.42718447	NA	NA	1	NA	0.00%	80.00%	NA	NA	0.00%	0.00%	NA
SVOC	Benzo(b)fluoranthene	9	6	66.67%	NA	NA	NA	NA	0.371	3.77358491	NA	NA	1.4	NA	NA	83.33%	NA	NA	NA	0.00%	NA
SVOC	Benzo(g,h,i)perylene	9	3	33.33%	NA	NA	NA	NA	0.31	1.25806452	NA	NA	0.39	NA	NA	33.33%	NA	NA	NA	0.00%	NA
SVOC	Benzo(k)fluoranthene	9	5	55.56%	NA	NA	NA	NA	0.258	4.26356589	NA	NA	1.1	NA	NA	80.00%	NA	NA	NA	0.00%	NA
SVOC	Chrysene	9	5	55.56%	NA	NA	2.8	0.428571	0.289	4.15224913	NA	NA	1.2	NA	0.00%	80.00%	NA	NA	0.00%	0.00%	NA
SVOC	Fluoranthene	9	5	55.56%	NA	NA	5.1	0.333333	0.514	3.307393	NA	NA	1.7	NA	0.00%	80.00%	NA	NA	0.00%	0.00%	NA
SVOC	Indeno(1,2,3-cd)pyrene	9	5	55.56%	NA	NA	NA	NA	0.382	1.72774869	NA	NA	0.66	NA	NA	40.00%	NA	NA	NA	0.00%	NA
SVOC	Pentachlorophenol	9	1	11.11%	NA	NA	NA	NA	NA	NA	NA	NA	0.99	NA	NA	NA	NA	NA	NA	NA	NA
SVOC	Phenanthrene	9	5	55.56%	NA	NA	1.5	0.28	0.237	1.7721519	NA	NA	0.42	NA	0.00%	80.00%	NA	NA	0.00%	0.00%	NA
SVOC	Pyrene	9	5	55.56%	NA	NA	2.6	0.653846	0.665	2.55639098	NA	NA	1.7	NA	0.00%	60.00%	NA	NA	0.00%	0.00%	NA
SVOC	Total HMW PAH	9	6	66.67%	NA	NA	9.6	1.670833	NA	NA	NA	NA	16.04	NA	33.33%	NA	NA	NA	0.00%	NA	NA
SVOC	Total LMW PAH	9	5	55.56%	NA	NA	3.16	1.518987	NA	NA	NA	NA	4.8	NA	40.00%	NA	NA	NA	0.00%	NA	NA
SVOC	Total PAH	9	6	66.67%	NA	NA	44.792	0.465262	NA	NA	NA	NA	20.84	NA	0.00%	NA	NA	NA	0.00%	NA	NA
PEST	4,4'-DDD	9	2	22.22%	NA	NA	0.02	2.9	NA	NA	NA	NA	0.058	NA	100.00%	NA	NA	NA	71.43%	NA	NA
PEST	4,4'-DDE	9	3	33.33%	NA	NA	0.027	3.703704	NA	NA	NA	NA	0.1	NA	66.67%	NA	NA	NA	83.33%	NA	NA
PEST	4,4'-DDT	9	2	22.22%	NA	NA	0.007	84.28571	NA	NA	NA	NA	0.59	NA	100.00%	NA	NA	NA	100.00%	NA	NA
PEST	alpha-Chlordane	9	3	33.33%	NA	NA	0.006	15.83333	NA	NA	NA	NA	0.095	NA	66.67%	NA	NA	NA	100.00%	NA	NA
PEST	Dieldrin	9	1	11.11%	NA	NA	0.008	9.625	0.00044	175	NA	NA	0.077	NA	100.00%	100.00%	NA	NA	100.00%	100.00%	NA
PEST	Endrin	9	1	11.11%	NA	NA	0.045	1.666667	NA	NA	NA	NA	0.075	NA	100.00%	NA	NA	NA	37.50%	NA	NA
PEST	Estimated Total PCBs	46	46	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	1.938	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
PEST	gamma-Chlordane	9	1	11.11%	NA	NA	0.006	3.5	NA	NA	NA	NA	0.021	NA	100.00%	NA	NA	NA	100.00%	NA	NA
PEST	Total Chlordane	9	3	33.33%	NA	NA	0.006	178.3333	NA	NA	NA	NA	1.07	NA	100.00%	NA	NA	NA	0.00%	NA	NA
PEST	Total DDT	9	4	44.44%	NA	NA	0.0461	15.141	NA	NA	NA	NA	0.698	NA	100.00%	NA	NA	NA	0.00%	NA	NA

TABLE 4.3.14-1: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-1 SEDIMENT DATA (0 TO 10 FEET BGS) (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	Ratio of Maximum Detected to HPAL	ER-M (mg/kg)	Ratio of Maximum Detected to ER-M	San Francisco Bay Sediment Ambient	Ratio of Maximum Detected to San Francisco Bay Sediment Ambient	PSC	Ratio of Maximum Detected to PSC	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than ER-M (%)	Detects Greater than San Francisco Bay Sediment Ambient (%)	Detects Greater than PSC (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than ER-M (%)	Nondetects Greater than San Francisco Bay Sediment Ambient (%)	Nondetects Greater than PSC (%)
PCB	Aroclor-1260	9	9	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	6.1	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
PCB	Total Aroclor	9	9	100.00%	NA	NA	0.18	36.97222	NA	NA	NA	NA	6.655	NA	100.00%	NA	NA	All Detected	All Detected	All Detected	All Detected
TPHEXT	Diesel-range organics	1	1	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	280	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
TPHEXT	Motor oil-range organics	1	1	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	630	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	1,2,3,4,6,7,8,9-OCDD	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	0.000818	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	1,2,3,4,6,7,8,9-OCDF	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	0.00025	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	1,2,3,4,6,7,8-HPCDD	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	0.000128	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	1,2,3,4,6,7,8-HPCDF	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	6.79E-05	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	1,2,3,4,7,8,9-HPCDF	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	1.46E-05	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	1,2,3,4,7,8-HXCDD	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	1.78E-06	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	1,2,3,4,7,8-HXCDF	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	3.1E-05	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	1,2,3,6,7,8-HXCDD	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	5.82E-06	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	1,2,3,6,7,8-HXCDF	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	8.71E-06	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	1,2,3,7,8,9-HXCDD	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	3.75E-06	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	1,2,3,7,8,9-HXCDF	2	1	50.00%	NA	NA	NA	NA	NA	NA	NA	NA	1.45E-06	NA	NA	NA	NA	NA	NA	NA	NA
DIOXIN	1,2,3,7,8-PECDF	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	2.96E-06	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	2,3,4,6,7,8-HXCDF	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	6.76E-06	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	2,3,4,7,8-PECDF	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	6.55E-06	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	2,3,7,8-TCDF	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	6.17E-06	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	TOTAL HPCDD	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	0.000225	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	TOTAL HPCDF	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	0.000181	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	TOTAL HXCDD	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	3.37E-05	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	TOTAL HXCDF	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	0.00011	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	TOTAL PECDD	2	1	50.00%	NA	NA	NA	NA	NA	NA	NA	NA	1.41E-06	NA	NA	NA	NA	NA	NA	NA	NA
DIOXIN	TOTAL PECDF	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	5.71E-05	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	TOTAL TCDD	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	4.69E-06	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
DIOXIN	TOTAL TCDF	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	5.62E-05	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
PCTMST	Percent moisture	10	10	100.00%	NA	NA	NA	NA	NA	NA	NA	NA	27	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceed HPALs or screening criteria.
See Appendix G for full statistical analysis.
Metal selection is based on samples from 0 to 10 feet bgs.
The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

bgs	Below ground surface	HPCDD	Heptachlorodibenzo-p-dioxin	OCDD	Octachlorodibenzo-p-dioxin	PSC	Protective soil concentration
Conc.	Concentration	HPCDF	Heptachlorodibenzofuran	OCDF	Octachlorodibenzofuran	TCDD	Tetrachlorodibenzo-p-dioxin
DDD	Dichlorodiphenyldichloroethane	HXCDD	Hexachlorodibenzo-p-dioxin	PCB	Polychlorinated biphenyl	TCDF	Tetrachlorodibenzofuran
DDE	Dichlorodiphenyldichloroethene	HXCDF	Hexachlorodibenzofuran	PECDD	Pentachlorodibenzo-p-dioxin	TPHEXT	Total petroleum hydrocarbons - extractable
DDT	Dichlorodiphenyltrichloroethane	mg/kg	Milligram per kilogram	PECDF	Pentachlorodibenzofuran	TPHPRG	Total petroleum hydrocarbons - purgeable
ER-M	Effects range–median for sediment	NA	Not applicable	PEST	Pesticide	SVOC	Semivolatile organic compound
HPAL	Hunters Point ambient level (for soil)	ND	Nondetect	PQL	Practical quantitation limit	VOC	Volatile organic compound

Source: Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.14-2: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-2 SEDIMENT DATA (0 TO 10 FEET BGS)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	ER-M (mg/kg)	Ratio of Maximum Detected to ER-M	San Francisco Bay Sediment Ambient	Ratio of Maximum Detected to San Francisco Bay Sediment Ambient	PSC	Ratio of Maximum Detected to PSC	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than ER-M (%)	Detects Greater than San Francisco Bay Sediment Ambient (%)	Detects Greater than PSC (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than ER-M (%)	Nondetects Greater than San Francisco Bay Sediment Ambient (%)	Nondetects Greater than PSC (%)
METAL	Aluminum	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	6530	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Antimony	2	1	50.00%	9.05	25	0.092	NA	NA	NA	NA	2.3	0.00%	0.00%	NA	NA	0.00%	0.00%	NA	NA
METAL	Arsenic	2	2	100.00%	11.1	70	0.077143	15.3	0.35294118	NA	NA	5.4	0.00%	0.00%	0.00%	NA	All Detected	All Detected	All Detected	All Detected
METAL	Barium	2	2	100.00%	314.4	NA	NA	NA	NA	NA	NA	24.2	0.00%	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Beryllium	2	1	50.00%	0.71	NA	NA	NA	NA	NA	NA	0.073	0.00%	NA	NA	NA	0.00%	NA	NA	NA
METAL	Cadmium	2	1	50.00%	3.14	9.6	0.614583	0.33	17.8787879	4.24	1.391509	5.9	100.00%	0.00%	100.00%	100.00%	0.00%	0.00%	100.00%	0.00%
METAL	Calcium	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	113000	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Chromium	2	2	100.00%	NA	370	0.135405	112	0.44732143	NA	NA	50.1	NA	0.00%	0.00%	NA	All Detected	All Detected	All Detected	All Detected
METAL	Cobalt	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	7.8	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Copper	2	2	100.00%	124.3	270	0.703704	68.1	2.79001468	1083.7	0.175325	190	50.00%	0.00%	50.00%	0.00%	All Detected	All Detected	All Detected	All Detected
METAL	Iron	2	2	100.00%	58000	NA	NA	NA	NA	NA	NA	24000	0.00%	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Lead	1	1	100.00%	8.99	218	0.254128	43.2	1.28240741	441.9	0.125368	55.4	100.00%	0.00%	100.00%	0.00%	All Detected	All Detected	All Detected	All Detected
METAL	Magnesium	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	10000	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Manganese	2	2	100.00%	1431.2	NA	NA	NA	NA	NA	NA	585	0.00%	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Mercury	2	1	50.00%	2.28	0.71	0.253521	0.43	0.41860465	NA	NA	0.18	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%	NA
METAL	Molybdenum	2	1	50.00%	2.68	NA	NA	NA	NA	NA	NA	1.1	0.00%	NA	NA	NA	0.00%	NA	NA	NA
METAL	Nickel	2	2	100.00%	NA	51.6	1.143411	112	0.52678571	1941.4	0.03039	59	NA	50.00%	0.00%	0.00%	All Detected	All Detected	All Detected	All Detected
METAL	Potassium	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	1250	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Silver	2	1	50.00%	1.43	3.7	0.040541	0.58	0.25862069	NA	NA	0.15	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%	NA
METAL	Sodium	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	4160	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Vanadium	2	2	100.00%	117.2	NA	NA	NA	NA	NA	NA	27.8	0.00%	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Zinc	1	1	100.00%	109.9	410	0.243902	158	0.63291139	719.3	0.139024	100	0.00%	0.00%	0.00%	0.00%	All Detected	All Detected	All Detected	All Detected
PEST	Estimated Total PCBs	14	14	100.00%	NA	NA	NA	NA	NA	NA	NA	0.522	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
PCB	Aroclor-1260	2	1	50.00%	NA	NA	NA	NA	NA	NA	NA	0.045	NA	NA	NA	NA	NA	NA	NA	NA
PCB	Total Aroclors	2	1	50.00%	NA	0.18	0.505556	NA	NA	NA	NA	0.091	NA	0.00%	NA	NA	NA	0.00%	NA	NA
TPHEXT	Diesel-range organics	1	1	100.00%	NA	NA	NA	NA	NA	NA	NA	21	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
O&G	Total Oil & Grease	1	1	100.00%	NA	NA	NA	NA	NA	NA	NA	340	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
PCTMST	Percent Moisture	1	1	100.00%	NA	NA	NA	NA	NA	NA	NA	10	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
PCTMST	Percent Solids	1	1	100.00%	NA	NA	NA	NA	NA	NA	NA	78.3	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
PH	pH	1	1	100.00%	NA	NA	NA	NA	NA	NA	NA	8	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected

Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceed HPALs or screening criteria.
See Appendix G for full statistical analysis.
Metal selection is based on samples from 0 to 10 feet bgs.
The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

bgs	Below ground surface	O&G	Oil & grease
Conc.	Concentration	PCB	Polychlorinated biphenyl
ER-M	Effects range–median for sediment	PEST	Pesticide
HPAL	Hunters Point ambient level (for soil)	PQL	Practical quantitation limit
mg/kg	Milligram per kilogram	PSC	Protective soil concentration
NA	Not applicable	TPHEXT	Total petroleum hydrocarbons - extractable
ND	Nondetect		

Source: Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

TABLE 4.3.14-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-3 SEDIMENT DATA (0 TO 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte Group	Chemical	Number of Analyses	Number of Detections	Percent Detection (%)	HPAL (mg/kg)	ER-M (mg/kg)	Ratio of Maximum Detected to ER-M	San Francisco Bay Sediment Ambient	Ratio of Maximum Detected to San Francisco Bay Sediment Ambient	PSC	Ratio of Maximum Detected to PSC	Maximum Detected Conc. (mg/kg)	Detects Greater than HPAL (%)	Detects Greater than ER-M (%)	Detects Greater than San Francisco Bay Sediment Ambient (%)	Detects Greater than PSC (%)	Nondetects Greater than HPAL (%)	Nondetects Greater than ER-M (%)	Nondetects Greater than San Francisco Bay Sediment Ambient (%)	Nondetects Greater than PSC (%)
METAL	Aluminum	9	9	100.00%	NA	NA	NA	NA	NA	NA	NA	12000	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Antimony	9	6	66.67%	9.05	25	1.56	NA	NA	NA	NA	39	50.00%	16.67%	NA	NA	0.00%	0.00%	NA	NA
METAL	Arsenic	9	9	100.00%	11.1	70	0.18571429	15.3	0.8496732	NA	NA	13	22.22%	0.00%	0.00%	NA	All Detected	All Detected	All Detected	All Detected
METAL	Barium	9	9	100.00%	314.4	NA	NA	NA	NA	NA	NA	270	0.00%	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Beryllium	9	7	77.78%	0.71	NA	NA	NA	NA	NA	NA	0.3	0.00%	NA	NA	NA	0.00%	NA	NA	NA
METAL	Cadmium	9	8	88.89%	3.14	9.6	1.25	0.33	36.36363636	4.24	2.83018868	.12	75.00%	37.50%	100.00%	75.00%	0.00%	0.00%	100.00%	0.00%
METAL	Calcium	9	9	100.00%	NA	NA	NA	NA	NA	NA	NA	110000	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Chromium	9	9	100.00%	NA	370	0.51351351	112	1.69642857	NA	NA	190	NA	0.00%	33.33%	NA	All Detected	All Detected	All Detected	All Detected
METAL	Cobalt	9	9	100.00%	NA	NA	NA	NA	NA	NA	NA	18	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Copper	6	6	100.00%	124.3	270	9.62962963	68.1	38.17914831	1083.7	2.39918797	2600	83.33%	50.00%	83.33%	16.67%	All Detected	All Detected	All Detected	All Detected
METAL	Iron	9	9	100.00%	58000	NA	NA	NA	NA	NA	NA	58000	0.00%	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Lead	6	6	100.00%	8.99	218	4.58715596	43.2	23.14814815	441.9	2.26295542	1000	100.00%	66.67%	100.00%	16.67%	All Detected	All Detected	All Detected	All Detected
METAL	Magnesium	9	9	100.00%	NA	NA	NA	NA	NA	NA	NA	32000	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Manganese	9	9	100.00%	1431.2	NA	NA	NA	NA	NA	NA	640	0.00%	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Mercury	9	9	100.00%	2.28	0.71	13.8028169	0.43	22.79069767	NA	NA	9.8	11.11%	33.33%	55.56%	NA	All Detected	All Detected	All Detected	All Detected
METAL	Molybdenum	9	2	22.22%	2.68	NA	NA	NA	NA	NA	NA	31	100.00%	NA	NA	NA	0.00%	NA	NA	NA
METAL	Nickel	9	9	100.00%	NA	51.6	6.58914729	112	3.03571429	1941.4	0.17513135	340	NA	77.78%	66.67%	0.00%	All Detected	All Detected	All Detected	All Detected
METAL	Potassium	9	8	88.89%	NA	NA	NA	NA	NA	NA	NA	1800	NA	NA	NA	NA	NA	NA	NA	NA
METAL	Selenium	9	1	11.11%	1.95	NA	NA	0.64	1.71875	1.95	0.56410256	1.1	0.00%	NA	100.00%	0.00%	0.00%	NA	0.00%	0.00%
METAL	Silver	9	8	88.89%	1.43	3.7	1.45945946	0.58	9.31034483	NA	NA	5.4	25.00%	12.50%	25.00%	NA	0.00%	0.00%	0.00%	NA
METAL	Sodium	9	9	100.00%	NA	NA	NA	NA	NA	NA	NA	12000	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Vanadium	9	9	100.00%	117.2	NA	NA	NA	NA	NA	NA	130	11.11%	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
METAL	Zinc	6	6	100.00%	109.9	410	11.4634146	158	29.74683544	719.3	6.5341304	4700	100.00%	66.67%	83.33%	16.67%	All Detected	All Detected	All Detected	All Detected
VOC	Naphthalene	9	4	44.44%	NA	2.1	0.16666667	0.0558	6.27240143	NA	NA	0.35	NA	0.00%	100.00%	NA	NA	0.00%	100.00%	NA
SVOC	2-Methylnaphthalene	9	2	22.22%	NA	0.67	0.41791045	0.0194	14.43298969	NA	NA	0.28	NA	0.00%	100.00%	NA	NA	0.00%	100.00%	NA
SVOC	Acenaphthene	9	1	11.11%	NA	0.5	0.28	0.0266	5.26315789	NA	NA	0.14	NA	0.00%	100.00%	NA	NA	0.00%	100.00%	NA
SVOC	Anthracene	9	3	33.33%	NA	1.1	0.13636364	0.088	1.70454545	NA	NA	0.15	NA	0.00%	100.00%	NA	NA	0.00%	100.00%	NA
SVOC	Benzo(a)anthracene	9	4	44.44%	NA	1.6	0.14375	0.244	0.94262295	NA	NA	0.23	NA	0.00%	0.00%	NA	NA	0.00%	20.00%	NA
SVOC	Benzo(a)pyrene	9	3	33.33%	NA	1.6	0.13125	0.412	0.50970874	NA	NA	0.21	NA	0.00%	0.00%	NA	NA	0.00%	0.00%	NA
SVOC	Benzo(b)fluoranthene	9	5	55.56%	NA	NA	NA	0.371	0.88948787	NA	NA	0.33	NA	NA	0.00%	NA	NA	NA	0.00%	NA
SVOC	Benzo(k)fluoranthene	9	4	44.44%	NA	NA	NA	0.258	1.08527132	NA	NA	0.28	NA	NA	25.00%	NA	NA	NA	0.00%	NA
SVOC	Carbazole	9	1	11.11%	NA	NA	NA	NA	NA	NA	NA	0.69	NA	NA	NA	NA	NA	NA	NA	NA
SVOC	Chrysene	9	4	44.44%	NA	2.8	0.12142857	0.289	1.17647059	NA	NA	0.34	NA	0.00%	50.00%	NA	NA	0.00%	0.00%	NA
SVOC	Fluoranthene	9	5	55.56%	NA	5.1	0.1372549	0.514	1.3618677	NA	NA	0.7	NA	0.00%	20.00%	NA	NA	0.00%	0.00%	NA
SVOC	Indeno(1,2,3-cd)pyrene	9	2	22.22%	NA	NA	NA	0.382	0.81151832	NA	NA	0.31	NA	NA	0.00%	NA	NA	NA	0.00%	NA
SVOC	Pentachlorophenol	9	1	11.11%	NA	NA	NA	NA	NA	NA	NA	1.4	NA	NA	NA	NA	NA	NA	NA	NA
SVOC	Phenanthrene	9	5	55.56%	NA	1.5	0.46666667	0.237	2.9535865	NA	NA	0.7	NA	0.00%	40.00%	NA	NA	0.00%	25.00%	NA
SVOC	Pyrene	9	5	55.56%	NA	2.6	0.20384615	0.665	0.79699248	NA	NA	0.53	NA	0.00%	0.00%	NA	NA	0.00%	0.00%	NA
SVOC	Total HMW PAH	9	5	55.56%	NA	9.6	0.42395833	NA	NA	NA	NA	4.07	NA	0.00%	NA	NA	NA	0.00%	NA	NA
SVOC	Total LMW PAH	9	5	55.56%	NA	3.16	1.18101266	NA	NA	NA	NA	3.732	NA	20.00%	NA	NA	NA	0.00%	NA	NA
SVOC	Total PAH	9	5	55.56%	NA	44.792	0.16190391	NA	NA	NA	NA	7.252	NA	0.00%	NA	NA	NA	0.00%	NA	NA
PEST	4,4'-DDD	9	1	11.11%	NA	0.02	0.8	NA	NA	NA	NA	0.016	NA	0.00%	NA	NA	NA	100.00%	NA	NA
PEST	4,4'-DDT	9	4	44.44%	NA	0.007	11.1428571	NA	NA	NA	NA	0.078	NA	100.00%	NA	NA	NA	100.00%	NA	NA
PEST	Estimated Total PCBs	28	28	100.00%	NA	NA	NA	NA	NA	NA	NA	0.619	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
PEST	Total DDT	9	5	55.56%	NA	0.0461	2.64642082	NA	NA	NA	NA	0.122	NA	80.00%	NA	NA	NA	0.00%	NA	NA
PCB	Aroclor-1260	9	8	88.89%	NA	NA	NA	NA	NA	NA	NA	0.7	NA	NA	NA	NA	NA	NA	NA	NA
PCB	Total Aroclor	9	8	88.89%	NA	0.18	4.14444444	NA	NA	NA	NA	0.746	NA	62.50%	NA	NA	NA	0.00%	NA	NA
TPHEXT	Diesel-Range Organics	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	1400	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
TPHEXT	Motor Oil-Range Organics	2	2	100.00%	NA	NA	NA	NA	NA	NA	NA	2600	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected
TPHPRG	Gasoline-Range Organics	2	1	50.00%	NA	NA	NA	NA	NA	NA	NA	820	NA	NA	NA	NA	NA	NA	NA	NA
PCTMST	Percent Moisture	11	11	100.00%	NA	NA	NA	NA	NA	NA	NA	47	NA	NA	NA	NA	All Detected	All Detected	All Detected	All Detected

TABLE 4.3.14-3: STATISTICAL ANALYSIS OF REDEVELOPMENT BLOCK EOS-3 SEDIMENT DATA (0 TO 10 FEET BGS) (CONTINUED)

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Notes: Data presented for all chemicals detected in at least one sample at concentrations that exceed HPALs or screening criteria.
See Appendix G for full statistical analysis.
Metal selection is based on samples from 0 to 10 feet bgs.
The HPAL for nickel is a sample-specific, regression analysis-based ambient level (Tetra Tech EM Inc. 1999). The HPALs, shown as a range, are calculated for each individual sample within the redevelopment block.

bgs	Below ground surface
Conc.	Concentration
ER-M	Effects range–median for sediment
HMW	High-molecular-weight
HPAL	Hunters Point ambient level (for soil)
LMW	Low-molecular-weight
mg/kg	Milligram per kilogram
NA	Not applicable
ND	Nondetect
PCB	Polychlorinated biphenyl
PEST	Pesticide
PQL	Practical quantitation limit
PSC	Protective soil concentration
TPHEXT	Total petroleum hydrocarbons - extractable
TPHPRG	Total petroleum hydrocarbons - purgeable
SVOC	Semivolatile organic compound
VOC	Volatile organic compound

Source:
Tetra Tech EM Inc. 1999. "Draft Technical Memorandum, Nickel Screening and Implementation Plan, Hunters Point Shipyard, San Francisco, California." August 4.

5.0 SUMMARY OF HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENTS

This section summarizes the potential human health and ecological risks from exposure to chemicals present in soil, groundwater, and sediment at Parcel E and identifies chemicals of concern (COC) for human and terrestrial ecological receptors. The nature and extent of chemicals in soil, groundwater, and sediment at Parcel E is presented in Section 4.0.

5.1 BASELINE HUMAN HEALTH RISK ASSESSMENT

The original HHRA for Parcel E was conducted in 1997 as part of the RI for Parcel E (PRC, LFR, and U&A 1997). Since the original RI was completed, additional data were collected at Parcel E during the SDGI and nonstandard data gaps investigation in 2002 (Tetra Tech 2004e, 2005). As part of this Revised RI Report, the HHRA was updated to account for soil data collected during the data gaps investigations and to incorporate changes in regulatory guidance and toxicological criteria that have occurred since the original HHRA was prepared in 1997. In addition, the revised HHRA includes groundwater data collected through quarter 20 (October to December 2004) as part of the basewide groundwater monitoring program for HPS. Lastly, revisions were made to the HHRA based on HPS BCT agreements during 2003 and 2004. Appendix I details the HHRA methods and results.

The revised HHRA was conducted with the following objectives:

- Estimate potential human health risks associated with potential future land use scenarios
- Identify environmental media and chemicals that pose the primary health concerns
- Identify environmental media and chemicals that are likely to pose little or no threat to human health
- Provide a foundation for assessing the need for further response actions

The HHRA calculated cancer risks and noncancer hazards from exposure to COPCs in all affected environmental media for each pathway identified as potentially complete. Based on agreement with the BCT, as a conservative approach, all detected chemicals in soil and groundwater, except four essential human nutrients were evaluated as COPCs in the HHRA. That is, screening criteria were not used to identify COPCs for the HHRA. Thus, the HHRA characterizes cumulative, or total, risk from exposure to all detected chemicals in soil and groundwater, whether site-related or at ambient levels. The HHRA for soil also includes a characterization of incremental risk, which does not include risks from metals present at or below HPALs.

The following sections provide an overview of the exposure scenarios and pathways evaluated in the HHRA and summarize the risks to each receptor from exposure to soil and groundwater at Parcel E.

5.1.1 Exposure Scenarios and Pathways

The Redevelopment Plan outlined the planned reuses for Parcel E (SFRA 1997). To help identify the areas of Parcel E associated with specific planned reuses, Parcel E was divided into redevelopment blocks. Each redevelopment block was then assigned a redevelopment block number. Figure 5-1 shows the locations of each of the redevelopment blocks assigned to Parcel E, the associated redevelopment block number, and the specific planned reuse for each redevelopment block. According to the Redevelopment Plan, most of the planned reuse for Parcel E is industrial and maritime/industrial (SFRA 1997). Other planned reuses of Parcel E include open space, research and development, and mixed use (SFRA 1997). The table below summarizes the planned reuses for each redevelopment block at Parcel E and the associated exposure scenario evaluated in the HHRA for each planned reuse.

Redevelopment Block	Planned Reuse	Associated Exposure Scenario
EMI-1	Maritime/Industrial	Industrial
31B/36	Industrial	
40	Industrial	
41	Industrial	
43	Industrial	
44	Industrial	
EOS-1	Open Space	Recreational
EOS-2	Open Space	
EOS-3	Open Space	
EOS-4	Open Space	
EOS-5	Open Space	
45	Research and Development	Residential
31A	Mixed Use	

Based on the planned reuses for Parcel E, and the likelihood that excavation and trenching activities will be required to develop Parcel E for the planned reuses, the following receptors were selected for evaluation in the revised HHRA for Parcel E:

- Resident (adult and child)
- Industrial worker (adult)
- Recreational user (adult and child)
- Construction worker (adult)

Table 5-1 summarizes the exposure pathways identified as potentially complete and incomplete for each of the receptors listed above. Both direct exposure pathways (for example, ingestion) and indirect exposure pathways (for example, ingestion of homegrown produce) for soil and groundwater were identified as potentially complete (see Table 5-1). Exposure pathways identified as potentially complete are quantitatively evaluated in the HHRA. Further information

regarding the exposure pathways for the HHRA, including sources of exposure and release mechanisms for contaminant sources is provided in the conceptual site model for the HHA (see Figure I-1 of Appendix I).

For the purposes of this HHRA, each redevelopment block at Parcel E was divided into 0.5-acre exposure areas (approximately 150 feet by 150 feet) and 2,500-square foot exposure areas. The 0.5-acre exposure area size was selected by the HPS BCT and the City as a reasonable estimate for a light industrial lot in the Bay area. The 2,500-square-foot exposure area was selected by the BCT as a reasonable estimate for a residential lot because it is a minimum residential lot size for a single-family home allowed by the San Francisco planning code (CCSF 1995). This HHRA refers to each 0.5-acre exposure area at Parcel E as an "industrial grid" and each 2,500-square foot exposure area as a "residential grid." Additionally, each grid was assigned a unique identification number, referred to as the "grid number." These grid-based exposure areas were used in the HHRA to assess risks from exposure to soil. Plume-based exposure areas were used to assess risks from exposure to groundwater (see Section 5.1.1.2).

For each exposure area, risks were evaluated for the specific planned reuse scenario associated with the redevelopment block. In addition to evaluating risks based on the planned reuse for each redevelopment block, the HHRA also evaluated risks for each redevelopment block to all potential receptors identified for Parcel E, regardless of the planned reuse for the redevelopment block. That is, areas planned for industrial (including construction worker) and recreational reuse were also evaluated for residential use, and areas planned for residential reuse were also evaluated for industrial (including construction worker) and recreational use. Hence, residential, industrial, recreational, and construction worker exposures were evaluated for each redevelopment block, regardless of the specific planned reuse of the redevelopment block. Exposure pathways evaluated for each of these receptors are consistent with those indicated for quantitative evaluation in Table 5-1.

These additional evaluations provide information on potential risks for all potential reuses for Parcel E, in the event that the redevelopment plan is revised prior to the Record of Decision (Navy 2004). An exception is the evaluation of residential exposure to groundwater in the B-aquifer from domestic use, as the B-aquifer is only evaluated for residential domestic use, and not all exposure scenarios. Appendix I contains the risk results for all exposure scenarios evaluated in the HHRA. The exposure pathways for soil and groundwater evaluated in the HHRA are described below; the HHRA results presented in this section are limited to results associated with the planned reuse of Parcel E.

5.1.1.1 Soil Exposure Pathways

Risks from exposure to soil were evaluated for each grid for which sampling data were available and for the sampling locations that have not been subject to removal actions. Residential grids were used to assess residential exposures, while industrial grids were used to assess industrial, recreational, and construction worker exposures.

Risks from exposure to COPCs in soil were assessed for two depth intervals in the HHRA: surface soil (0 to 2 feet bgs) and subsurface soil (0 to 10 feet bgs). Industrial and residential receptors were evaluated for two soil scenarios, one for exposure to surface soil and one for exposure to subsurface soil. The surface soil scenario assumes minimal development of the site occurs, and that the soil at the site is not disturbed beyond a depth of 2 feet. The subsurface soil scenario assumes intrusive development of the site and extensive excavation of site soil, making deeper soils available at the surface for contact. Excavation of deeper soils is not expected to occur beyond a depth of 10 feet, which is the typical depth that can be reached by construction equipment. Exposure to recreational receptors was assumed to be limited to the shallower, surface soil depth interval, based on the assumption that intrusive, site development activities are not expected in areas planned for open space reuse. Construction worker receptors were assumed to be exposed to the deeper, subsurface soil depth interval, based on the assumption that construction workers will be involved with intrusive, soil excavation activities.

5.1.1.2 Groundwater Exposure Pathways

Risks from exposure to COPCs in groundwater were assessed for the A- and B-aquifers. For the A-aquifer, the only complete exposure pathway for planned reuses at Parcel E is residential and industrial exposure to groundwater from inhalation of volatile COPCs in the A-aquifer that migrate through the subsurface to indoor air (vapor intrusion). Although not associated with the planned reuses for Parcel E, construction worker exposure to groundwater in the A-aquifer may occur during trenching activities. Residential exposure to groundwater in the A-aquifer from domestic use (such as ingestion) was not evaluated in the HHRA because the A-aquifer at HPS is not considered a potential source of drinking water (see Section 3.0). However, because groundwater in the B-aquifer is considered to be a low potential source of drinking water, residential exposure to groundwater was evaluated for the B-aquifer.

Risks from exposure to groundwater in the A-aquifer from vapor intrusion (residential and industrial receptors) and from trenching activities (construction worker) were assessed for eight risk plume-based areas: IR-02, IR-03, IR-05, IR-08, IR-12, IR-39, Building 406, and Building 521 (see Figure 5-3). In addition, residential exposure to groundwater from domestic use was assessed for three plume-based exposure areas in the B-aquifer: IR-02, IR-03, and Building 406. These plume-based exposure areas were delineated using both the most recent sample data in the RI data set and historical groundwater data for purposes of the HHRA; for this reason, these plumes are referred to as the in the HHRA as risk plumes. The process used to delineate the risk plumes is summarized below.

Based on agreements made with the BCT, the risk plumes were delineated based on historical groundwater data and the most recent groundwater data in the RI data set, incorporating the 12 most recent sampling results in the RI data set (through December 2004) for each chemical at each well (see Attachment I-4 of Appendix I). Boundaries for the risk plumes were established by delineating analytical results for volatile chemicals from this data set to nondetectable concentrations. Chemical data used to delineate risk plumes in the A-aquifer was limited to data for volatile chemicals because vapor intrusion of volatile chemicals in the A-aquifer to indoor air is the primary pathway of exposure for the A-aquifer.

Construction worker exposure to the A-aquifer includes exposure to both volatile and nonvolatile chemicals. Although the risk plumes delineated in the A-aquifer were based on volatile chemicals, all detected chemicals (volatile and nonvolatile) within the delineated boundaries of the risk plume were included for evaluation of construction worker exposure. Chemical concentrations detected at some groundwater sampling locations at Parcel E were not associated with risk plumes; as a result, these nonplume-based locations were evaluated on a grid-basis, using the same grid system that was used in the HHRA to evaluate soil exposures as an efficient mechanism to locate each nonplume exposure area for the HHRA.

Chemical plumes are not present in the B-aquifer at Parcel E; however, risk plume boundaries delineated for the A-aquifer were extrapolated vertically and applied to the B-aquifer as part of this HHRA. Since the delineated A-aquifer risk plumes represent worst-case scenarios of groundwater contamination, and since contaminant plumes have not been identified in the B-aquifer at Parcel E, the extrapolated boundaries of the B-aquifer are conservative and likely represent larger areas than present-day conditions warrant. Extrapolation of the boundaries of the A-aquifer risk plumes to the B-aquifer was based on meetings between with EPA, DTSC, and the Navy in 2003 and 2004. The extrapolated plume boundaries were used to represent exposure areas for the B-aquifer for the residential domestic use evaluation. Of the eight risk plumes delineated for the A-aquifer, boundaries for three of the risk plumes (IR-02, IR-03, and Building 406) were extrapolated to the B-aquifer. The boundaries for the remaining risk plumes in the A-aquifer were not extrapolated to the B-aquifer because the B-aquifer is not present in those risk plume areas. Similar to the approach used for the A-aquifer, chemical concentrations detected at groundwater sampling locations in the B-aquifer at Parcel E that fell outside of the extrapolated plume boundaries were evaluated as non-plume exposure areas, using the exposure area grids established for soil.

The risk plumes reflect a worst-case scenario of groundwater contamination because the methodology used to delineate risk plumes includes historical data over 10 years old. Figures 4-3 through 4-6 show the 2004 plume boundaries for metals, VOCs, pesticides, and PCBs and TPH. The lateral extent of 2004 plumes at Parcel E is smaller than the extent of the risk plumes evaluated in the HHRA; likewise, concentrations of volatile chemicals are less than the concentrations evaluated in the HHRA (see Section 4.1.2.3).

5.1.2 Total and Incremental Risks for Soil Exposure

Both total and incremental risks were evaluated for exposure to soil at Parcel E. For the total risk evaluation, all detected chemicals were included as COPCs regardless of concentration, except for the essential nutrients calcium, magnesium, potassium, and sodium. The total risk evaluation provides an estimate of the risks posed by all chemicals at Parcel E, including those present at concentrations at or below ambient levels. For the incremental risk evaluation, the above essential nutrients and metals with maximum detected concentrations below HPALs were excluded as COPCs. The incremental risk evaluation provides an estimate of risks posed by all chemicals at Parcel E, except those that do not exceed ambient levels.

No toxicity criteria are currently available for evaluating health risks from exposure to lead. Therefore, specific cancer risk or noncancer hazard results for lead were assessed by comparing exposure point concentrations (EPC) for lead with (1) a HPS-specific risk-based concentration for lead (155 mg/kg) for residential and recreational receptors and (2) the EPA Region 9 industrial preliminary remediation goal for lead (800 mg/kg) for industrial and construction worker receptors.

5.1.3 Soil Risk Summary

This section summarizes the results of the total and incremental risk evaluations for soil based on planned reuse.

5.1.3.1 Total Risk Evaluation

For the total risk evaluation, risks from residential and industrial exposure to COPCs in soil were assessed for both surface soil (0 to 2 feet bgs) and subsurface soil (0 to 10 feet bgs). The evaluation of recreational and construction worker exposures to COPCs in soil were limited to surface and subsurface soil, respectively. Figures 5-2 and 5-3 summarize the total risk results for surface and subsurface soil, respectively, at each risk grid based on the planned reuse of the redevelopment block associated with each grid. Figure 5-4 summarizes the total risk results for construction worker exposure to soil at each risk grid. Results for each grid are shown relative to the cancer risk threshold of $1\text{E-}06$, the highest segregated noncancer hazard index (HI) of 1.0, and the HPS risk-based concentration for lead (155 mg/kg for residential and recreational receptors, and 800 mg/kg for industrial and construction worker receptors). Tables 5-2, 5-3, and 5-4 present the specific calculated total cancer risk and noncancer HI results for each grid.

The risk results shown in the above-referenced figures and tables represent total risk; that is, all detected chemicals not considered to be essential human nutrients were included in the total risk evaluation. Risks were assessed for 141 grids in the industrial reuse areas, 103 grids in the residential reuse areas, and 46 grids in the open space reuse areas. Results of the total risk evaluation showed that of these grids, 134 grids in the industrial reuse areas, 99 grids in the residential reuse areas, and 44 grids in the open space reuse areas exceeded the cancer risk threshold of $1\text{E-}06$ or the noncancer threshold HI of 1.0. For the construction worker exposure scenario, risks were assessed for 227 grids; 207 of these grids exceeded the cancer risk threshold of $1\text{E-}06$ or the noncancer threshold HI of 1.0.

Tables 5-5, 5-6, and 5-7 present a risk characterization analysis for each grid for which the total cancer risk or segregated noncancer HI exceeds thresholds. For each of these grids, the tables identify the COCs (that is, the chemicals for which the chemical-specific cancer risk exceeds $1\text{E-}06$ or the highest segregated HI exceeds 1.0) and show the percent contribution of the COCs to the calculated total risks and hazards for each exposure pathway evaluated.

The following chemicals are identified as COCs in at least one grid based on planned reuse and results of the total risk evaluation for soil.

Exposure Scenario	Chemicals of Concern in Surface Soil (0 to 2 feet bgs), Total Risk		Chemicals of Concern in Subsurface Soil (0 to 10 feet bgs), Total Risk	
Industrial ^a	Aroclor-1254 Aroclor-1260 Arsenic Benzo(a)anthracene Benzo(a)pyrene	Benzo(b)fluoranthene Benzo(k)fluoranthene Dibenzo(a,h)anthracene Indeno(1,2,3-cd)pyrene Lead Naphthalene	1,2,4-Trimethylbenzene 1,3,5-Trimethylbenzene Aldrin Aroclor-1248 Aroclor-1254 Aroclor-1260 Arsenic Benzene	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Dibenzo(a,h)anthracene Indeno(1,2,3-cd)pyrene Lead Naphthalene
Recreational ^a	1,2,3,4,6,7,8-HPCDD 1,2,3,7,8-PECDD 2,3,4,7,8-PECDF Aroclor-1254 Aroclor-1260 Arsenic	Benzo(k)fluoranthene Chrysene Dibenzo(a,h)anthracene Dieldrin Indeno(1,2,3-cd)pyrene Lead	Not applicable	
Recreational ^a	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene	PCB-105 PCB-118 PCB-187 PCB-206	Not Applicable	
Residential ^a	Antimony Aroclor-1260 Arsenic Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Bis(2-Ethylhexyl)phthalate Dibenzo(a,h)anthracene Cadmium Copper	Dieldrin Indeno(1,2,3-cd)pyrene Iron Lead Manganese Mercury Nickel Pentachlorophenol Thallium Vanadium Zinc	Antimony Aroclor-1254 Aroclor-1260 Arsenic Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Bis(2-Ethylhexyl)phthalate Cadmium Copper Dibenzo(a,h)anthracene	Dieldrin Indeno(1,2,3-cd)pyrene Iron Lead Manganese Mercury Nickel Pentachlorophenol Silver Thallium Vanadium Zinc
Construction ^b	Not applicable		1,2,3,7,8-PECDD 2,3,4,7,8-PECDD 1,2,4-Trichlorobenzene 1,2,4-Trimethylbenzene 1,3,5-Trimethylbenzene 2,3,4,6,7,8-HXCDF Aldrin Antimony Aroclor-1248 Aroclor-1254 Aroclor-1260 Arsenic Benzene Benzo(a)anthracene Benzo(a)pyrene	Benzo(b)fluoranthene Benzo(k)fluoranthene Copper Dibenzo(a,h)anthracene Indeno(1,2,3-cd)pyrene Iron Lead Manganese Mercury Naphthalene Nickel n-Nitroso-di-n-propylamine Vanadium

Notes:

a COCs identified for this exposure scenario are based on the planned reuse for Parcel E.

b The construction worker exposure scenario is not associated with a specific planned reuse for Parcel E. Based on agreement with the BCT, evaluation of construction worker exposure to soil was based on subsurface soil from 0 to 10 feet bgs; this depth range includes surface soil (0 to 2 feet bgs) exposure.

HPCDD Heptachlorodibenzo-p-dioxin

HXCDF Hexachlorodibenzofuran

PECDD Pentachlorodibenzo-p-dioxin

Of these chemicals, the following most frequently occur as COCs for each exposure scenario for the total risk evaluation:

- For industrial exposure (industrial and maritime industrial reuse areas), arsenic and PAHs (primarily benzo[a]pyrene) were the most frequently occurring COCs. Arsenic was a COC in 93 percent of the grids evaluated, and the PAH benzo(a)pyrene was a COC in 33 percent the grids evaluated.
- For residential exposure (mixed-use and research and development reuse areas), metals (arsenic, iron, manganese, nickel, and vanadium) were identified as COCs in most of the grids evaluated. Arsenic was identified as a COC in 73 percent of the grids evaluated, iron in 93 percent, manganese in 63 percent, nickel in 86 percent, and vanadium in 58 percent.
- For recreational exposure (open space reuse areas), arsenic, benzo(a)pyrene, lead, and Aroclor-1260 were COCs in over 40 percent of the grids evaluated.
- For construction worker exposure (evaluated parcel-wide), arsenic was identified as a COC in 93 percent of the grids evaluated. Lead, PAHs, and PCBs were also identified as COCs in approximately 10 to 15 percent of the grids evaluated.

5.1.3.2 Incremental Risk Evaluation

For the incremental risk evaluation, risks from residential and industrial exposure to COCs in soil were assessed for both surface soil (0 to 2 feet bgs) and subsurface soil (0 to 10 feet bgs). The evaluation of recreational and construction worker exposures to COCs in soil was limited to surface and subsurface soil, respectively. Figures 5-5 and 5-6 summarize the incremental risk results for surface and subsurface soil, respectively, at each grid based on the planned reuse of the redevelopment block associated with each grid. Figure 5-7 summarizes the incremental risk results for construction worker exposure to soil at each grid. Tables 5-8, 5-9, and 5-10 list the incremental cancer risk and noncancer HI results calculated for each grid.

The risk results shown in the above-referenced figures and tables represent incremental risk; that is, all detected chemicals except essential human nutrients and metals below HPALs were included in the risk evaluation. Risks were assessed for 141 grids in the industrial reuse areas, 103 grids in the residential reuse areas, and 46 grids in the open space reuse areas. Results of the incremental risk evaluation showed that of these grids, 71 grids in the industrial reuse areas, 53 grids in the residential reuse areas, and 37 grids in the open space reuse areas exceeded the cancer risk threshold of $1\text{E-}06$ or the noncancer threshold HI of 1.0. For the construction worker exposure scenario, risks were assessed for 227 grids; of these grids, 108 exceeded the cancer risk threshold of $1\text{E-}06$ or the noncancer threshold HI of 1.0. Compared to the total risk evaluation for soil, under the incremental risk evaluation, there is on average a 43 percent reduction in the number of exposure areas at Parcel E that exceed the cancer risk threshold of $1\text{E-}06$ or the noncancer threshold HI of 1.0 (based on highest segregated HI) for the planned reuses of Parcel E.

Tables 5-11, 5-12, and 5-13 present a risk characterization analysis for those grids for which the total cancer risk or segregated noncancer HI exceeded thresholds. For each of these grids, the tables identify the COCs and present their contribution to the calculated incremental risks and hazards for each potentially complete exposure pathway.

The following chemicals were identified as COCs in at least one grid based on planned reuse and results of the incremental risk evaluation for soil.

Exposure Scenario	Chemicals of Concern in Surface Soil (0 to 2 feet bgs), Incremental Risk		Chemicals of Concern in Subsurface Soil (0 to 10 feet bgs), Incremental Risk	
Industrial ^a	Aroclor-1254 Aroclor-1260 Arsenic Benzo(a)anthracene Benzo(a)pyrene	Benzo(b)fluoranthene Benzo(k)fluoranthene Dibenzo(a,h)anthracene Indeno(1,2,3-cd)pyrene Lead Naphthalene	1,2,4-Trimethylbenzene 1,3,5-Trimethylbenzene Aldrin Aroclor-1248 Aroclor-1254 Aroclor-1260 Arsenic Benzene	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Dibenzo(a,h)anthracene Lead Naphthalene
Recreational ^a	1,2,3,4,6,7,8-HPCDD 1,2,3,7,8-PECDD 2,3,4,7,8-PECDF Aroclor-1254 Aroclor-1260 Arsenic Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene	Chrysene Dibenzo(a,h)anthracene Dieldrin Indeno(1,2,3-cd)pyrene Lead PCB-105 PCB-118 PCB-187 PCB-206	Not applicable	
Residential ^a	Antimony Aroclor-1260 Arsenic Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Bis(2-Ethylhexyl)phthalate Dibenzo(a,h)anthracene Cadmium	Copper Dieldrin Indeno(1,2,3-cd)pyrene Iron Lead Manganese Mercury Pentachlorophenol Thallium Vanadium Zinc	Antimony Aroclor-1254 Aroclor-1260 Arsenic Benzo(a)anthracene Benzo(a)pyrene Benzo(k)fluoranthene Bis(2-Ethylhexyl)phthalate Cadmium Copper	Dibenzo(a,h)anthracene Dieldrin Indeno(1,2,3-cd)pyrene Iron Lead Manganese Mercury Pentachlorophenol Silver Thallium Vanadium Zinc
Construction ^b	Not applicable		1,2,3,7,8-PECDD 2,3,4,7,8-PECDD 1,2,4-Trichlorobenzene 1,2,4-Trimethylbenzene 1,3,5-Trimethylbenzene 2,3,4,6,7,8-HXCDF Aldrin Antimony Aroclor-1248 Aroclor-1254 Aroclor-1260 Arsenic Benzene Benzo(a)anthracene	Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Copper Dibenzo(a,h)anthracene Indeno(1,2,3-cd)pyrene Iron Lead Manganese Mercury Naphthalene Nickel n-Nitrosodi-n-propylamine Vanadium

Notes:

- a COCs identified for this exposure scenario are based on the planned reuse for Parcel E.
- b The construction worker exposure scenario is not associated with a specific planned reuse for Parcel E. Based on discussion with the BCT, evaluation of construction worker exposure to soil was based on subsurface soil from 0 to 10 feet bgs; this depth range includes surface soil (0 to 2 feet bgs) exposure.

Of these chemicals, the following most frequently occur as COCs for each exposure scenario for the incremental risk evaluation:

- For industrial exposure (industrial and maritime industrial reuse areas), arsenic and PAHs (primarily benzo[a]pyrene) occur as COCs in approximately 33 percent of the grids evaluated.
- For residential exposure (mixed-use and research and development reuse areas), arsenic is a COC in 15 percent of the grids evaluated and manganese is a COC in 29 percent of the grids evaluated.
- For recreational exposure (open space reuse areas), arsenic, lead, and benzo(a)pyrene, were COCs in over 30 percent of the grids evaluated.
- For construction worker exposure (evaluated parcel-wide), arsenic was identified as a COC in 40 percent of the grids evaluated. Lead, PAHs, and PCBs were also identified as COCs in approximately 10 to 15 percent of the grids evaluated.

5.1.4 Groundwater Risk Summary

Risks from exposure to COPCs in groundwater were assessed for the A- and B-aquifers. Figure 5-8 summarizes the risk results for industrial and residential exposure to the A-aquifer from vapor intrusion for each of the identified risk plumes and nonplume exposure, based on the planned reuse for each redevelopment block. Figure 5-9 summarizes the risk results for residential domestic use of groundwater in the B-aquifer. Figure 5-10 summarizes the risk results for construction worker exposure to groundwater in the A-aquifer. Results in these figures are shown relative to the cancer risk threshold of $1E-06$ and highest segregated noncancer HI of 1.0.

Tables 5-14 and 5-15 present a risk characterization analysis for those exposure areas in the A-aquifer for which the cancer risk exceeded $1E-06$ or the highest segregated HI exceeded 1.0 for the exposure scenarios associated with planned reuse and the construction worker scenario, respectively. These tables identify the groundwater COCs associated with each Parcel E risk plume and the percent contribution of each COC to the total cancer risk and HI calculated for each plume. Exposure areas in the A-aquifer not associated with risk plumes with COCs are shown in Tables 5-14 and 5-15. The following chemicals were identified as COCs in groundwater in the A-aquifer based on planned reuse.

Exposure Scenario	Chemicals of Concern in A-Aquifer Groundwater	
Industrial ^a	1,1-DCA 1,2-DCE (total) 1,4-DCB Benzene Bromodichloromethane Carbon tetrachloride Chloroform	Isopropylbenzene Naphthalene PCE TCE Vinyl chloride Xylene (total)
Recreational ^a	Not applicable	
Residential ^a	1,1-DCA 1,4-DCB Benzene Chloroform	Isopropylbenzene Naphthalene PCE TCE

Exposure Scenario	Chemicals of Concern in A-Aquifer Groundwater	
Construction ^b	1,2-DCE (total) 1,4-DCB Arsenic Benzene Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene	Chloroform Chrysene Indeno(1,2,3-cd)pyrene Naphthalene Pentachlorophenol TCE Vinyl chloride

Notes:

- a COCs identified for this exposure scenario are based on the planned reuse for Parcel E.
b The construction worker exposure scenario is not associated with a specific planned reuse for Parcel E.

Table 5-16 shows the risk results from exposure to groundwater in the B-aquifer. The risk results shown in Table 5-16 are limited to those exposure areas for which the cancer risk exceeded 1E-06 or the noncancer HI exceeded 1.0. Risk results for groundwater in the B-aquifer, which was evaluated for residential exposure from domestic use, are based on each exposure area evaluated, regardless of planned reuse. The following chemicals were identified as COCs in groundwater in the B-aquifer based on planned reuse.

Exposure Scenario	Chemicals of Concern in B-Aquifer Groundwater	
Residential	1,4-DCB Arsenic Manganese Thallium	PCE TCE Vinyl Chloride

5.2 BASELINE ECOLOGICAL RISK ASSESSMENT

This section summarizes the results of the BERA of ecological receptors exposed to soil in the open space at Parcel E. The complete BERA is provided in Appendix J of this Revised RI Report. ERAs are intended to fulfill the following three basic tasks under CERCLA:

1. Document whether actual or potential ecological risks exist at a site
2. Identify chemicals at a site that pose an unacceptable ecological risk
3. Generate data to be used to evaluate cleanup options, if necessary

All three of these tasks have been accomplished in part by previously completed investigations at Parcel E. Appendix J summarizes work completed to date and provides a refinement of the conclusions reached in the 1997 ERA (Tetra Tech, LFR, and U&A 1997), the Draft Final Validation Study Report (Tetra Tech and LFR 2000a), and the PSC Technical Memorandum (Tetra Tech and LFR 2000b). Soil samples collected since the 2000 Parcel E Validation Study were evaluated using methods consistent with the previous investigations.

5.2.1 Overview of the Ecological Risk Assessment Process at Parcel E

The EPA separates the ERA process into the following eight steps (EPA 1997):

- Step 1: Screening-level problem formulation and evaluation of ecological effects
- Step 2: Screening-level preliminary exposure estimate and risk calculation
- Step 3: Baseline risk assessment problem formulation
- Step 4: Study design and data quality objectives
- Step 5: Field verification of sampling design
- Step 6: Site investigation and analysis of exposure and effects
- Step 7: Risk characterization
- Step 8: Risk management

This BERA was initiated before the current 8-step framework guidance by EPA was released; however, the essential elements of the current guidance are represented. Elements of the screening-level ecological risk assessment (SLERA) and problem formulation (Steps 1, 2, and 3) are summarized in Sections 5.2.2 (Ecological Setting), 5.2.3 (Data Evaluated), and 5.2.4 (Conceptual Site Model and Risk Questions). The results of the Step 3a risk refinement are described in Section 5.2.5 (Chemicals of Potential Ecological Concern). Steps 4, 5, and 6, which were completed in 2000, are summarized in Section 5.2.6 (Update of the Validation Study and Calculation of Additional Protective Soil Concentrations). Section 5.2.7 summarizes the results of the evaluation of risk to birds and mammals based on the RI data set, and Section 5.2.8 presents the results of the risk characterization. Section 5.2.9 presents the conclusions of the BERA. Step 8, risk management, will occur in cooperation with the regulatory agencies at a later date.

5.2.2 Ecological Setting

Parcel E is characterized by patches of ruderal vegetation, industrial areas, and landscaped areas, as described in Section 3.7 of the Revised RI Report. This BERA addresses only areas that are unpaved and not occupied by buildings. The unpaved open space evaluated in this BERA includes terrestrial areas designated as Redevelopment Blocks EOS-1, EOS-2, and EOS-3 on Figure 5-11.

The terrestrial area of Parcel E is a relatively simple habitat dominated by a variety of weedy and ornamental plant species. Plants, the primary producers in these ecosystems, provide leafy vegetation, seeds, and fruits for the primary consumers. The most common observed primary consumer was an omnivorous mammal, the house mouse, and a typical herbivorous insect at the

site is the grasshopper. Granivores, such as mourning doves (*Zenaida macroura*), house finches (*Carpodacus mexicanus*), and sparrows, feed on plant seeds. Terrestrial invertebrates, such as insects and earthworms, are consumed by a variety of birds, including the mockingbird (*Mimus polyglottos*), meadowlark (*Sturnella neglecta*), loggerhead shrike (*Lanius ludovicianus*), and American kestrel. Top predators include the red-tailed hawk (*Buteo jamaicensis*) and red fox (*Vulpes vulpes*).

5.2.3 Data Evaluated

All chemicals detected in soil samples from open space areas (Redevelopment Blocks EOS-1, EOS-2, and EOS-3) in Parcel E were screened to identify chemicals of potential ecological concern (COPEC). Inorganic and organic chemicals were screened against toxicity benchmarks for selected receptors, as recommended by EPA (1997). Due to poor habitat quality, plants and terrestrial invertebrates were eliminated as receptors of concern during previous phases of this investigation (PRC 1994a, 1996a, 1996b; Tetra Tech, LFR, and U&A 1997; Tetra Tech and LFR 2000a, 2000b). This risk assessment focused on terrestrial birds and mammals as ecological receptors of concern.

The open space designated as Redevelopment Blocks EOS-1, EOS-2, and EOS-3 was considered a single exposure unit in this BERA. Most of the area is unpaved; however, limited paved areas were included for geographic continuity. This land is planned for future recreational use as open space.

The site-specific data set used in this BERA included laboratory analysis of surface soil samples for metals, VOCs, SVOCs, pesticides, PCBs, TPH, and dioxins and furans. Soil samples collected from 0 to 3 feet bgs were evaluated as a single exposure unit.

All samples collected from 0 to 3 feet bgs from areas that are now within the boundary of Parcel E open space are included, regardless of when they were collected. Samples collected from the Parcel E shoreline, which represents the area below the high tide line, were excluded. Samples from areas that are now considered Parcel E-2 also were excluded. Any samples from areas that were excavated prior to December 2004 as part of a removal action also were removed from the data set. The combined data set used in this BERA included nearly 300 surface soil samples (collected between 0 and 3 feet bgs), although the sample size varied by type of analysis (see Appendix J, Table J-1).

5.2.4 Conceptual Site Model and Risk Questions

During previous investigations, plants and terrestrial invertebrates were evaluated as assessment endpoints. The poor quality and fragmentation of the habitat was acknowledged by the regulatory agencies during review of previous reports on Parcel E (see Appendix A of the Draft Final Validation Study [Tetra Tech and LFR 2000a]), and it was agreed that this BERA would consider risk to birds and mammals only.

The CSM for this BERA contains few complete exposure pathways, thus it is relatively straightforward (see Figure 5-12). Carnivorous terrestrial birds and omnivorous small mammals were assumed to be exposed to chemicals in surface soil and food items at Parcel E, based on surveys performed during previous phases of the RI (Tetra Tech and LFR 2000a, 2000b). Neither ingestion of surface water, dermal exposure, nor inhalation was considered significant at Parcel E.

The risk question at Parcel E is equally straight forward: *Do chemicals in soil or food items at Parcel E pose a risk to the continued health and well-being of populations of carnivorous birds or omnivorous small mammals that forage there?* Components of this overall question included the evaluation of effects on survival, growth, and reproduction of key species. The metrics used to answer the risk question were detected concentrations of COPECs in soil and PSCs.

The open space in Parcel E provides foraging habitat for a variety of birds and mammals with broad habitat requirements and a high tolerance for human disturbance. Results of previous investigations of Parcel E indicated the house mouse is a fairly common permanent resident and the red-tailed hawk and American kestrel are frequent visitors (Tetra Tech and LFR 2000a). Therefore, these three species were selected as representative or surrogate species for this BERA. Carnivorous birds, represented by the kestrel and the red-tailed hawk, spend only a portion of their time foraging at Parcel E, which provides low-quality habitat for these wide-ranging species. Small mammals, in contrast, were assumed to forage exclusively at Parcel E.

The specific assessment endpoints are sufficient rates of survival, growth, and reproduction to sustain populations of species representing the trophic guilds listed below.

- Carnivorous bird (represented by the American kestrel)
- Raptors (represented by the red-tailed hawk)
- Omnivorous mammals (represented by the house mouse)

5.2.5 Chemicals of Potential Ecological Concern

The inorganic chemicals for which both the toxicity screening value and the HPAL were exceeded, as well as inorganic chemicals for which no screening values were available, were evaluated further in this BERA (see Appendix J, Table J-4). The following chemicals were retained as COPECs in the ERA for birds and mammals:

- | | |
|------------|--------------|
| • Antimony | • Lead |
| • Arsenic | • Molybdenum |
| • Barium | • Nickel |
| • Chromium | • Zinc |
| • Copper | |

Organic chemicals were largely eliminated as COPECs during the 1997 ERA and Parcel E Validation Study (Tetra Tech, LFR, and U&A 1997; Tetra Tech and LFR 2000a, 2000b). In this BERA, organic chemicals were considered COPECs if the EPC exceeded the EPCs reported in the 1997 RI Report by at least 10 percent. Concentrations of chemicals for which the current EPCs were within 10 percent of the previously evaluated EPCs were considered unchanged since the 1997 RI, so no update was required. As a result, the following organic COPECs were reevaluated in this BERA (see Appendix J, Table J-4):

- Toluene
- TCE
- Xylene
- PCBs (as total Aroclors)
- Total DDTs

5.2.6 Update of the Validation Study and Calculation of Additional Protective Soil Concentrations

This section expands on the formulation presented in the Parcel E Validation Study (Tetra Tech and LFR 2000a) and incorporates comments received from the regulatory agencies and natural resource trustees on the Validation Study. The purpose of the Parcel E Validation Study was to refine the Phase 1 ERA for birds and mammals by using site-specific bioaccumulation factors in the food chain model.

Subsequent to the findings of the Validation Study that birds and mammals may be at risk from several metals in soil at Parcel E, the Navy and the regulatory agencies agreed to calculate site-specific PSCs that represent metals concentration in soil that, if met, would reduce the risk to acceptable levels. In 2000, PSCs were calculated for cadmium, copper (for birds only), lead, nickel, selenium, and zinc using the results for collocated soil and tissue samples collected from Parcel E during the Validation Study (Tetra Tech and LFR 2000b).

Since the PSCs were derived, additional soil samples were collected, removal actions were completed, and the boundaries of Parcel E were changed (see Appendix A of this Revised RI Report). The conclusions of the 1997 ERA and the Validation Study are considered valid for the area that was evaluated at that time, and the PSCs that were derived are applicable to all of Parcel E. As a result, it is not necessary to reevaluate the conclusions of the 1997 ERA or the Validation Study. However, the Navy was concerned that chemicals eliminated as COPECs during the Validation Study may be elevated above risk-based concentrations in the new data set due to the spatial heterogeneity of soil concentrations. To address this issue, the new data set was evaluated for consistency with the previous data set to identify any additional chemicals that should be included in the ERA.

Based on the comparison of pre-2000 data with all data, PSCs were calculated for the following chemicals: molybdenum, toluene, TCE, xylene, total DDTs, and total Aroclors. New PSCs were calculated for copper (for mammals only), molybdenum, toluene, TCE, xylene, total DDTs, and total Aroclors because none were provided in the PSC Technical Memorandum (Tetra Tech and

LFR 2000b). PSCs for lead in mammals were recalculated because new mammalian toxicity reference values (TRV) for lead became available after the original PSCs were developed. Risk estimates for mammals based on both the previous TRV (adjusted for bioavailability) and the new TRV (not adjusted for bioavailability) are provided in Appendix J, Section J5.4.

5.2.7 Evaluation of Risk to Birds and Mammals

Of the inorganic chemicals carried forward from the Phase 1 ERA and the Validation Study, or added during this update only copper and lead were shown to pose unacceptable risk to birds or mammals under the site-specific conditions at Parcel E assessed in this ERA. EPCs for cadmium and selenium at Parcel E were less than HPALs; EPCs for nickel and zinc exceeded HPALs but were less than the PSCs for birds and mammals. Table 5-17 lists the EPCs and hazard quotients (HQ) calculated for each of the representative receptors for selected chemicals.

The identification of risk posed by lead is problematical because the result depends on which TRV and bioavailability assumption is used. The original TRV was coupled with an estimate that lead in soil at Parcel E is 10 percent as bioavailable as lead acetate was in the laboratory study from which the low TRV was derived. As a result, HQs less than 1.0 were calculated for both birds and mammals. The revised TRV required by the regulatory agencies, with an assumption of 100 percent bioavailability, resulted in an HQ of 2.67 for the house mouse (adult) and 1.19 for the kestrel.

The only organic chemicals that were retained as COPECs were PCBs (total Aroclors and total DDTs). Both total Aroclors and total DDTs were eliminated as COPECs during the Phase 1 ERA and Validation Study. However, the EPCs for total Aroclors and total DDTs in the RI soil data set were substantially greater than the concentrations reported in earlier reports, so these chemicals were reevaluated in the ERA. The HQs for total Aroclors ranged from 1.29 to 2.16. The HQs for DDTs were all less than 1.0.

Results of the risk evaluation indicated carnivorous birds (such as the American kestrel) and small omnivorous mammals (such as the house mouse) may be at risk from ingested doses of copper, lead, and PCBs at Parcel E. Both lead and copper occur at concentrations well above the HPALs, and both of these metals are known to cause adverse effects to vertebrates when ingested. However, the magnitude of the HQ (all less than 2.7) and the low quality of the habitat at Parcel E suggests that risk is not immediate or severe. Because the low TRVs, which represent a lowest observable adverse effect level, were used to derive the PSCs, an HQ greater than 1.0 does not indicate immediate unacceptable risk. Nevertheless, any HQ greater than 1.0 is generally interpreted as indicating some risk.

5.2.8 Risk Characterization

The open area in Parcel E is best characterized as marginal, ruderal habitat of limited ecological significance. This description is corroborated by the California Department of Fish and Game's comments on the Parcel E Validation Study, which stated, "The onshore habitat at Parcel E is of

moderate quality and isolated from good wildlife habitat. Consequently, this site is not considered a high priority for terrestrial receptors by DFG" (Tetra Tech and LFR 2000a; Appendix E). The Navy agrees with this general evaluation of Parcel E. The principal concern at Parcel E is that chemicals in soil will be transported to the more ecologically sensitive and valuable offshore area (Parcel F). The migration of chemicals to the Bay is being concurrently addressed under a separate investigation, the results of which are presented in Appendix G of this Revised RI Report.

The only resident small mammal documented at Parcel E is the house mouse, which is not normally considered to warrant government protection. A 200-trap night effort yielded several house mice but no deer mice, the native small mammal that was the original focus of the Phase 1 ERA. The house mouse was shown to be at risk from ingested doses of copper, lead, and PCBs, with HQs ranging from 1.29 (PCBs) to 2.67 (lead). These values do not indicate significant, immediate risk to mammals.

The house mouse is of interest primarily as a potential conduit of chemicals to the red-tailed hawk. Dose estimates for the red-tailed hawk, based on a diet of house mouse, were below risk-based concentrations for all chemicals. High-quality habitat with intact vegetation and limited human disturbance is available to the red-tailed hawk in the nearby hills, west of HPS. Although individual red-tailed hawks have been observed at Parcel E, the parcel does not represent a significant foraging ground for the population. No risk to the hawk was suggested by any of the data collected at Parcel E.

The American kestrel is widely distributed in open habitats throughout the entire state of California and throughout the United States. It is of interest in the risk assessment because it consumes a variety of large insect and small vertebrate prey, which may contain chemicals accumulated from soil at Parcel E. The kestrel may be at risk from lead (HQ = 1.19) and PCBs (HQ = 2.16) ingested in soil and food items. Although any HQ greater than 1.0 is interpreted as indicating potential risk, the values calculated for the kestrel do not raise significant concerns about the overall health of kestrel populations in the area.

5.2.9 Summary and Conclusions of the Ecological Risk Assessment

The open space of Parcel E that was investigated in this ERA is slated for future use as a recreational area for the human population of the greater Bay area. The land immediately adjacent to the open space is designated industrial, maritime/industrial, or mixed use. The most likely use of the adjacent area is as a business park. The physical disturbances that typically occur in such an urban park setting are expected to limit the attractiveness of the open space to all but the most tolerant wildlife species, such as the house mouse and kestrel.

Results of the risk evaluation indicated carnivorous birds (such as the American kestrel) and small omnivorous mammals (such as the house mouse) may be at risk from ingested doses of copper, lead, and PCBs at Parcel E. Lead occurs at concentrations well above the HPALs, and is known to cause adverse effects to vertebrates when ingested. However, the magnitude of the HQ (all less than 2.7) and the low quality of the habitat at Parcel E suggests that risk is not immediate

or severe. Any HQ greater than 1.0 is generally interpreted as indicating some risk in a SLERA. In a BERA, however, more realistic assessment is appropriate. Because the low TRVs, which represent a lowest observable adverse effect level, were used to derive the PSCs, an HQ greater than 1.0 does not indicate immediate unacceptable risk.

In summary, no significant unacceptable risk to ecological receptors was indicated at Parcel E. The maximum HQs based on PSCs derived using the low TRV were 2.16 (for kestrels exposed to PCBs in soil) and 2.67 for the house mouse (exposed to lead in soil). Because the house mouse is not considered to warrant protection as a species, and no other small mammals were trapped at the site, this level of risk is acceptable. The low HQ for the kestrel does not indicate population-level risk of a magnitude that warrants remediation.

5.3 RESULTS OF THE PARCEL E SHORELINE HUMAN HEALTH RISK ASSESSMENT AND SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT

This section summarizes the potential human health and ecological risks from exposure to chemicals present in sediments along the shoreline at Parcel E and identifies COCs for human health and environmental receptors. Potential risk from exposure to chemicals present in sediment was evaluated for the entire shoreline area at HPS, including the shoreline area associated with Parcel E. The risk assessments for sediment are being conducted as part of the Parcel F (offshore area) RI/FS activities and are drawn from for use in this Revised Parcel E RI Report.

A complete description of the methods used in performing the HHRA are provided in the Final Hunters Point Shipyard Parcel F Validation Study (Battelle, BBL, and Neptune & Company 2005), and Attachment 1 of this Revised RI Report contains tables from the Parcel F Validation Study summarizing the HHRA results. Appendix G presents the detailed results of the SLERA, which was performed as part of the Parcels E and E-2 Shoreline Characterization Technical Memorandum.

5.3.1 Risk to Human Health Along the Parcel E Shoreline

This section presents the results of the human health evaluation of the Parcel E shoreline sediments. The HHRA was performed according to standard EPA risk assessment guidance (EPA 1989, 1992).

Current and reasonably anticipated future human exposure to COPCs associated with the shoreline along Parcel E was estimated. It was assumed that the primary exposure pathway would be through the consumption of shellfish, and that individuals harvesting shellfish would be directly exposed to sediments via direct contact and incidental ingestion. For the purposes of the human health risk assessment, the entire shoreline was considered as one exposure unit.

Risks to humans were calculated using sediment data from the Parcel E and E-2 shoreline at HPS. EPCs were developed to model exposures under both a reasonable maximum exposure (RME) and a central tendency exposure (CTE) scenarios. The RME relies on conservative exposure factors to estimate the RMEs anticipated for a site, whereas the CTE describes a more typical or average exposure to an individual. The EPCs for direct contact for both the RME and CTE were defined as the 95 percentile upper confidence limit of the surface sediments collected along the Parcels E and E-2 shoreline.

Using the EPCs for each media (sediment and shellfish tissue) and the parameters described above, doses associated with each scenario were calculated using the standard risk equations presented below.

Sediment Exposures

$$Dose(mg / kg - day) = \frac{(C_{sed} \times IR_{sed} \times FI \times EF \times ED) + (C_{sed} \times SA \times AF \times DAF \times FI \times EF \times ED)}{BW \times AT} \quad (5-1)$$

Consumption of Shellfish

$$Dose(mg / kg - day) = \frac{C_{tissue} \times IR_{tissue} \times EF \times ED \times FI}{BW \times AT} \quad (5-2)$$

where:

Dose	=	Rate of chemical intake across the body (milligrams per kilogram per day [mg/kg-day])
C	=	Chemical concentration in contaminated media or EPC (mg/kg)
IR	=	Contact or ingestion rate (milligrams per day)
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
FI	=	Fraction ingestion (unitless)
SA	=	Skin surface area exposed (square centimeters per day)
AF	=	Skin adherence factor (milligrams per square centimeter)
DAF	=	Dermal absorption factor (unitless)
BW	=	Body weight (kilogram)
AT	=	Averaging time (days)

Attachment 1 (see Table 1) summarizes the specific exposure factors used to derive the dose calculated for each exposure scenario. With the exception of the shellfish ingestion rate, the exposure parameters used were the same as those used to estimate risk for the Parcel F sediments in the Parcel F Validation Study (Battelle, BBL, and Neptune & Company 2005).

The doses derived in this manner for each scenario were then summed to estimate a lifetime average daily dose and average daily dose for each constituent by sampling area based on the adult and child RME and CTE exposure scenarios, respectively.

A summary of the individual risk and hazard values calculated for all chemicals evaluated within each exposure scenario is presented in Attachment 1 (see Tables 2 and 3). Total cumulative risks and the risk drivers for each scenario are summarized in Attachment 1 (see Tables 4 and 5). Cancer risks derived in this assessment can be compared with EPA's risk management range (that is, 1E-06 to 1E-04) for health protectiveness at Superfund sites. Based on this range, EPA typically considers 1E-06 as the "point of departure" for taking action at Superfund sites (EPA 1989).

Risks associated with direct contact to sediment were relatively low. For the RME scenario, PCBs were the only chemical with a risk greater than 1E-06. For the CTE scenario, all risks were below 1E-06 and hazards were below 1. For the shellfish ingestion pathway, the primary risk drivers associated with Parcels E and E-2 shoreline sediments were arsenic, chromium, total PCBs, and dioxins. Risks for these chemicals exceeded 1E-06 for both RME and CTE scenarios. Risks for arsenic and dioxins were similar to those for reference areas, but risks for chromium and total PCBs associated with site sediments were higher than those for reference areas (Battelle, BBL, and Neptune & Company 2005). For noncancer risks, total PCBs were the primary contributor.

Based on this evaluation, chromium and total PCBs appear to be the primary COCs for the evaluation of human health along the Parcel E shoreline.

5.3.2 Risk to Ecological Receptors Along the Parcel E Shoreline

The Navy conducted a SLERA to determine if chemicals detected along the shoreline pose an ecological risk to those receptors exposed to the narrow intertidal zone of Parcels E and E-2 (see Appendix G). For the purposes of the SLERA, the habitat along the entire shoreline was considered as one exposure unit. In addition, the shoreline was not divided into Parcels E and E-2 because it would reduce sample sizes below what is practicable for assessing risk.

Sediment samples were analyzed for metals, VOCs, SVOCs, pesticides, PCBs, TPH, dioxins and furans, and organotins. All chemicals detected in sediment samples from the shoreline were screened to identify COPECs. A toxicity-based approach was used to identify site-related chemicals that may pose risks to sensitive ecological receptors, including benthic invertebrates, birds, and mammals.

This section summarizes the characterization of risk posed to benthic invertebrates, birds, and mammals from surface and subsurface sediments. Concentrations of chemicals in sediment were compared with effects ranges to assess potential risk to benthic invertebrates. Food-chain models were used to assess the exposure of birds and mammals to ingested chemicals. Ingested doses were estimated for three birds (willet, surf scoter, and red tailed-hawk) and one mammal (house mouse). Details of the values used in the dose equation and the assumptions of the exposure assessment are provided in Appendix G, Shoreline Technical Memorandum.

Risk to Benthic Invertebrates

The characterization of risk posed to benthic invertebrates from surface and subsurface sediment is summarized below.

Surface Sediment: All detected inorganic and organic chemicals in sediment were evaluated in the toxicological screen by evaluating the HQ (ratio of exposure point concentrations in surface sediment to effects range-median [ER-M] values). Chemicals with HQs greater than 1.0 were considered COPECs for benthic invertebrates. Table G-6 in Appendix G, Shoreline Technical Memorandum, presents the HQs.

HQs ranged from 1.30 for zinc to 3.19 for nickel for benthic invertebrates. No ER-M value is available for molybdenum, so it was considered a COPEC by default. The HQ for cadmium was less than 1.0; therefore, it was eliminated as a COPEC for benthic invertebrates.

Exposure concentrations for 4,4'-dichlorodiphenyldichloroethane (DDD), 4,4'-dichlorodiphenyldichloroethene (DDE), 4,4'-DDT, total DDTs, and PCBs exceeded their respective ER-M values; therefore, they were retained as primary COPECs for benthic invertebrates. HQs for these COPECs ranged from 1.19 (DDE) to 356.67 (total PCBs) (see Table G-6 in Appendix G, Shoreline Technical Memorandum).

Subsurface Sediment: Risk to benthic invertebrates from subsurface sediment was evaluated exactly as described above for surface sediment. Chemicals with HQs greater than 1.0 were considered COPECs for benthic invertebrates. Table G-7 in Appendix G, Shoreline Technical Memorandum) presents HQs based on the ratio of exposure point concentrations in subsurface sediment to ER-M values. HQs ranged from 1.12 for antimony to 65.46 for copper.

Exposure concentrations for 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, total DDTs, dieldrin, endrin, and PCBs exceeded their respective ER-M values; therefore, they were retained as primary COPECs for benthic invertebrates. HQs for these COPECs ranged from 2.9 (DDD) to 1,500 (total PCBs).

In summary, copper, lead, zinc, and PCBs were measured at concentrations that pose a potential risk to benthic invertebrates in surface and subsurface sediment from the Parcels E and E-2 shoreline. For all of these metals, exposure point concentrations are higher in the subsurface samples. Several HQs for pesticides in sediment indicated potential risk, especially DDT and dieldrin in the subsurface samples.

Risk to Birds

Based on life history and foraging habits, daily doses were estimated for the surf scoter, willet, and red-tailed hawk feeding along the Parcels E and E-2 shoreline. Site-specific daily dose estimates were compared with high and low TRVs to evaluate the potential adverse biological effects on each receptor (see Table 4 in Appendix G). Based on this comparison, the risk to representative receptors was characterized; this comparison was performed in a manner consistent with EPA's HQ methodology (EPA 1998), as presented below.

$$HQ = \frac{Dose}{TRV} = \frac{(mg/kg-day)}{(mg/kg-day)} \quad (5-3)$$

where:

HQ	=	Hazard quotient (unitless)
Dose	=	Chemical-, receptor-, and site-specific daily dose estimate (mg/kg-day)
TRV	=	Chemical- and receptor-specific toxicity reference value (mg/kg-day)

A receptor is considered to exhibit potential significant risk if the HQ is greater than 1 using the high TRV. In contrast, a receptor is considered to exhibit only a potential risk if the HQ is greater than 1 using the low TRV.

Significant risk to birds was indicated only for the willet exposed to total PCBs. Results of the food-chain modeling indicated no significant risk to either the surf scoter or the red-tailed hawk. Other chemicals for which potential risk to birds is suggested include cadmium, copper, lead, mercury, PCBs, total DDTs, and dieldrin.

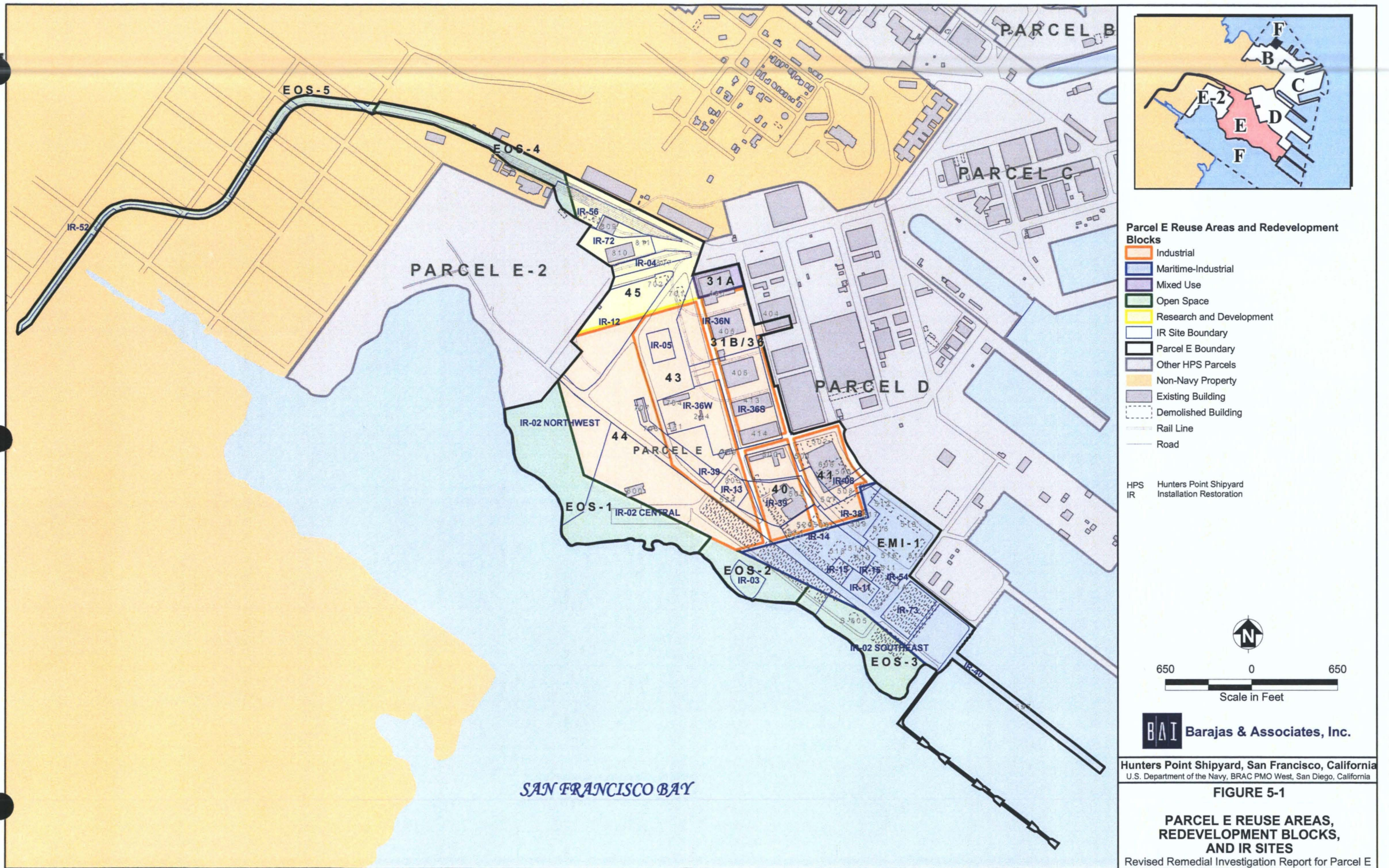
Risk to Mammals

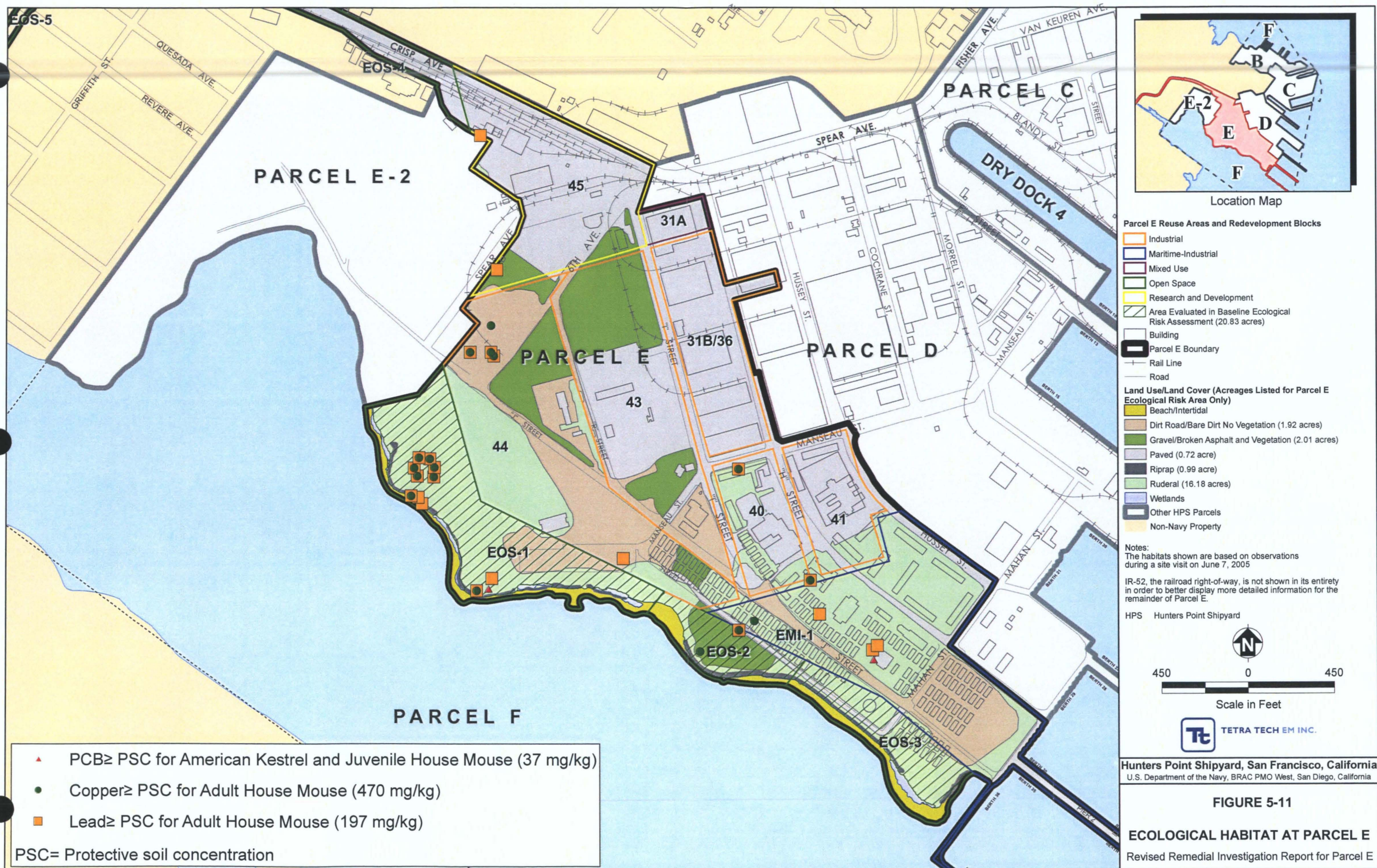
Risk to mammals was evaluated in the same way as risk to birds described above. Based on life history and foraging habits, daily dose estimates were calculated for the omnivorous house mouse feeding along the Parcels E and E-2 shoreline. HQs were calculated using the high and low TRVs. Doses for aluminum, antimony, molybdenum, and PCBs indicated significant risk to the mouse from both surface and subsurface sediment. Doses based on surface samples also exceeded the high TRV for cadmium and vanadium. Subsurface doses exceeded the high TRV for copper and zinc (see Table 5 of Appendix G). A complete set of HQs is provided in Table G-18 of Appendix G).

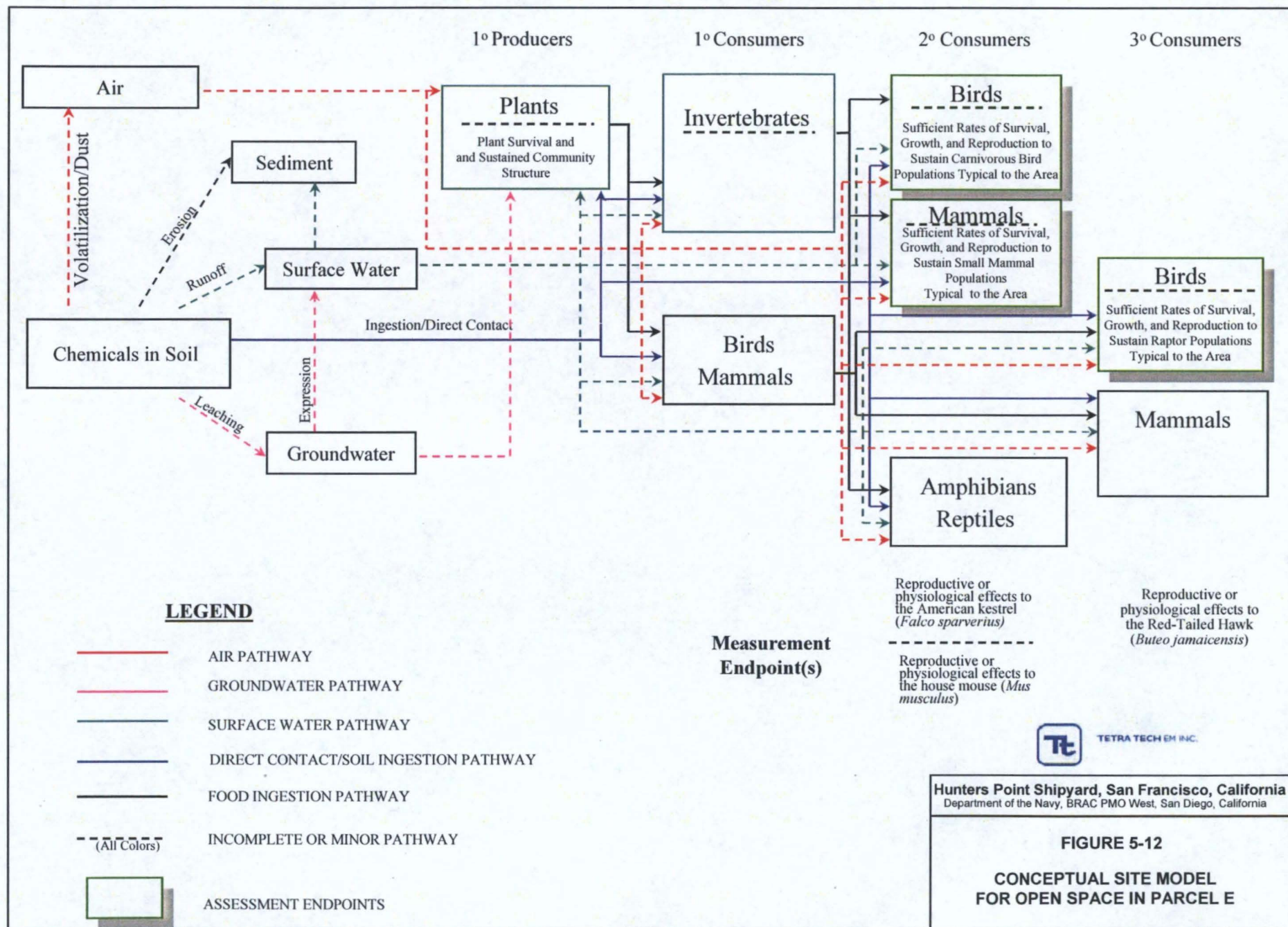
The greatest significant risk (high TRV HQ) was indicated for PCBs ingested by the house mouse. A complete discussion of the chemicals posing risk and the chemicals that pose no significant risk to the house mouse is presented in Appendix G.

Based on the results of the SLERA, risk to invertebrates, birds, and mammals along the shoreline should be evaluated further in an FS to determine the appropriate remedial alternative for the intertidal sediments along the entire Parcels E and E-2 shoreline.

FIGURES







TABLES

TABLE 5-1: POTENTIALLY COMPLETE EXPOSURE PATHWAYS FOR THE REVISED BASELINE HUMAN HEALTH RISK ASSESSMENT
 Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Exposure Scenario Grid Size		SOIL									GROUNDWATER						
		0 to 2 feet bgs				0 to 10 feet bgs					A-Aquifer				B-Aquifer		
		Ingestion	Dermal	Inhalation (outdoor particulates and VOCs)	Home-grown Produce	Ingestion	Dermal	Inhalation (outdoor particulates and VOCs)	Inhalation (vapor intrusion)	Home-grown Produce	Ingestion	Dermal	Inhalation (vapor intrusion)	Inhalation (construction trench)	Ingestion	Dermal	Inhalation (household use)
Residential	2,500 ft²	●	●	●	●	●	●	●	● ^a	●	—	—	●	—	●	● ^b	●
Industrial	0.5 acre	●	●	●	—	●	●	●	● ^a	—	—	—	●	—	—	—	—
Recreational	0.5 acre	●	●	●	—	—	—	—	—	—	—	—	—	—	—	—	—
Construction	0.5 acre	—	—	—	—	●	●	●	—	—	—	●	—	●	—	—	—

Notes:
 a Complete exposure pathway, but not evaluated in the HHRA. The Navy will complete a focused soil gas survey to address this pathway before the feasibility study is finalized for Parcel E, as necessary.
 b Addressed in Uncertainty Analysis (see Section I9.0 of Appendix I)
 — Not quantitatively evaluated in HHRA
 ● Quantitatively evaluated in HHRA
 bgs Below ground surface
 ft² Square foot
 HHRA Human health risk assessment
 VOC Volatile organic compound

TABLE 5-2: TOTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SURFACE SOIL (0 TO 2 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
31B/36	IND	AP27	1E-07	<1	<1
31B/36	IND	AR27	4E-06	<1	<1
31B/36	IND	AR28	1E-05	<1	<1
31B/36	IND	AS27	4E-06	<1	<1
31B/36	IND	AS28	2E-05	<1	<1
31B/36	IND	AS29	3E-05	<1	<1
31B/36	IND	AT27	1E-05	<1	<1
31B/36	IND	AT28	1E-05	<1	<1
31B/36	IND	AT29	3E-04	<1	<1
31B/36	IND	AU28	2E-05	<1	<1
31B/36	IND	AU29	2E-04	<1	<1
31B/36	IND	AU30	5E-08	<1	<1
31B/36	IND	AU31	6E-06	<1	<1
31B/36	IND	AV29	1E-04	<1	<1
31B/36	IND	AV30	5E-06	<1	<1
40	IND	AW31	3E-05	<1	<1
40	IND	AX33	1E-05	<1	<1
40	IND	AY33	1E-07	<1	<1
40	IND	AZ33	2E-05	<1	<1
40	IND	AZ34	2E-05	<1	<1
40	IND	BA33	2E-05	<1	<1
41	IND	BA29	2E-05	<1	<1
41	IND	BA30	1E-05	<1	<1
41	IND	BA31	8E-06	<1	<1
41	IND	BA32	7E-06	<1	<1
41	IND	BB29	2E-05	<1	<1
41	IND	BB30	5E-05	<1	<1
41	IND	BB31	1E-05	<1	<1
43	IND	AN30	2E-05	<1	<1
43	IND	AO28	5E-08	<1	<1
43	IND	AO29	4E-06	<1	<1
43	IND	AO30	2E-05	<1	<1
43	IND	AO31	2E-05	<1	<1
43	IND	AP29	2E-04	<1	<1
43	IND	AP30	2E-05	<1	<1
43	IND	AP31	2E-05	<1	<1
43	IND	AQ30	3E-05	<1	<1
43	IND	AQ32	2E-06	<1	<1
43	IND	AR29	7E-06	<1	<1
43	IND	AR30	1E-05	<1	<1
43	IND	AR31	3E-05	<1	<1
43	IND	AR32	1E-05	<1	<1
43	IND	AR33	2E-05	<1	<1
43	IND	AS30	3E-05	<1	<1
43	IND	AS31	2E-05	<1	<1
43	IND	AS32	3E-05	<1	<1
43	IND	AS33	7E-06	<1	<1
43	IND	AS34	2E-05	<1	<1
43	IND	AT30	1E-05	<1	<1
43	IND	AT31	1E-05	<1	<1
43	IND	AT32	3E-05	<1	<1
43	IND	AT33	3E-05	<1	<1
43	IND	AT34	1E-07	<1	<1

TABLE 5-2: TOTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SURFACE SOIL (0 TO 2 FEET BGS) (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
43	IND	AU32	2E-05	<1	<1
43	IND	AU33	1E-05	<1	<1
43	IND	AU34	2E-05	<1	<1
43	IND	AV32	1E-05	<1	<1
43	IND	AV33	7E-05	<1	<1
43	IND	AV34	2E-05	<1	<1
43	IND	AW33	2E-05	<1	<1
43	IND	AW34	3E-05	<1	<1
44	IND	AL32	2E-05	<1	<1
44	IND	AM31	9E-06	<1	<1
44	IND	AM32	2E-05	<1	<1
44	IND	AM33	2E-05	<1	<1
44	IND	AM34	3E-05	<1	<1
44	IND	AM35	8E-05	<1	<1
44	IND	AN31	1E-05	<1	<1
44	IND	AN32	2E-05	<1	<1
44	IND	AN33	3E-05	<1	<1
44	IND	AO35	8E-06	<1	<1
44	IND	AP34	1E-05	<1	<1
44	IND	AP35	1E-06	<1	<1
44	IND	AP36	1E-06	<1	<1
44	IND	AP37	3E-05	<1	<1
44	IND	AQ33	8E-06	<1	<1
44	IND	AQ35	1E-05	<1	<1
44	IND	AQ36	3E-05	<1	<1
44	IND	AQ37	1E-07	<1	<1
44	IND	AR34	1E-05	<1	<1
44	IND	AR35	2E-06	<1	<1
44	IND	AR36	1E-05	<1	<1
44	IND	AR37	8E-06	<1	<1
44	IND	AS36	8E-06	<1	<1
44	IND	AU35	8E-06	<1	<1
44	IND	AU36	5E-06	<1	<1
44	IND	AV36	3E-05	<1	<1
44	IND	AW35	1E-07	<1	<1
44	IND	AW36	2E-05	<1	<1
44	IND	AX35	1E-05	<1	<1
44	IND	AY35	3E-05	<1	<1
45	RD	032075	2E-07	1E+01	5E+00
45	RD	033077	8E-05	1E+01	7E+00
45	RD	034074	2E-07	9E+00	5E+00
45	RD	035079	4E-04	5E+00	2E+00
45	RD	036074	1E-07	1E+01	3E+00
45	RD	037076	5E-05	7E+00	4E+00
45	RD	038074	3E-07	1E+01	5E+00
45	RD	038079	6E-04	3E+01	2E+01
45	RD	039081	--	<1	<1
45	RD	040073	3E-07	1E+01	6E+00
45	RD	040074	4E-05	5E+00	2E+00
45	RD	040075	1E-04	8E+00	5E+00
45	RD	040082	2E-04	3E+00	<1
45	RD	041082	2E-04	6E+00	<1
45	RD	042073	2E-04	1E+01	3E+00

TABLE 5-2: TOTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SURFACE SOIL (0 TO 2 FEET BGS) (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
45	RD	042081	4E-04	1E+01	5E+00
45	RD	042082	2E-04	2E+01	5E+00
45	RD	043081	5E-04	1E+01	7E+00
45	RD	043082	2E-07	1E+01	5E+00
45	RD	044073	2E-04	7E+00	2E+00
45	RD	044079	4E-04	1E+01	4E+00
45	RD	044080	6E-05	7E+00	3E+00
45	RD	044081	3E-07	1E+01	5E+00
45	RD	045073	3E-05	3E+00	<1
45	RD	045074	7E-05	1E+01	3E+00
45	RD	045075	5E-05	7E+00	3E+00
45	RD	045078	2E-07	8E+00	5E+00
45	RD	045080	3E-05	1E+01	6E+00
45	RD	046072	2E-04	1E+01	3E+00
45	RD	046074	8E-05	2E+01	1E+01
45	RD	046076	1E-04	1E+01	3E+00
45	RD	046077	9E-05	9E+00	4E+00
45	RD	046079	8E-05	8E+00	2E+00
45	RD	046080	3E-07	1E+01	5E+00
45	RD	046082	3E-04	5E+01	3E+01
45	RD	047076	9E-05	6E+00	2E+00
45	RD	047077	2E-04	6E+00	2E+00
45	RD	047086	8E-05	5E+00	<1
45	RD	047089	1E-04	9E+00	2E+00
45	RD	047092	2E-07	7E+00	4E+00
45	RD	048072	7E-05	1E+01	8E+00
45	RD	048076	7E-09	<1	<1
45	RD	048080	2E-04	8E+01	7E+01
45	RD	049079	2E-04	1E+01	4E+00
45	RD	049085	2E-07	9E+00	5E+00
45	RD	049088	3E-07	9E+00	6E+00
45	RD	049091	1E-04	8E+00	3E+00
45	RD	050071	2E-07	9E+00	4E+00
45	RD	050077	3E-04	7E+00	2E+00
45	RD	050083	3E-08	7E+00	3E+00
45	RD	050086	1E-04	6E+00	2E+00
45	RD	050088	3E-07	9E+00	6E+00
45	RD	052071	4E-07	1E+01	9E+00
45	RD	052075	3E-05	1E+01	6E+00
45	RD	052082	5E-07	9E+00	4E+00
45	RD	052085	1E-07	6E+00	2E+00
45	RD	053080	2E-04	5E+00	2E+00
45	RD	053081	2E-07	1E+01	4E+00
45	RD	053082	2E-07	6E+00	2E+00
45	RD	053083	5E-05	7E+00	2E+00
45	RD	053085	6E-05	7E+00	<1
45	RD	054071	8E-08	7E+00	2E+00
45	RD	054074	1E-04	5E+00	<1
45	RD	054075	1E-04	5E+00	2E+00
45	RD	054077	5E-05	9E+00	4E+00
45	RD	054079	4E-05	9E+00	4E+00
45	RD	054081	4E-05	8E+00	3E+00
45	RD	055073	3E-07	1E+01	6E+00

TABLE 5-2: TOTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SURFACE SOIL (0 TO 2 FEET BGS) (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
45	RD	059078	3E-07	9E+00	3E+00
EMI-1	MI	AZ35	5E-06	<1	<1
EMI-1	MI	BA34	3E-05	<1	<1
EMI-1	MI	BA35	3E-06	<1	<1
EMI-1	MI	BB32	2E-05	<1	<1
EMI-1	MI	BB33	3E-05	<1	<1
EMI-1	MI	BB34	3E-05	<1	<1
EMI-1	MI	BB35	7E-06	<1	<1
EMI-1	MI	BC32	7E-06	<1	<1
EMI-1	MI	BC33	1E-05	<1	<1
EMI-1	MI	BC34	4E-06	<1	<1
EMI-1	MI	BC35	3E-08	<1	<1
EMI-1	MI	BD31	2E-08	<1	<1
EMI-1	MI	BD32	3E-05	<1	<1
EMI-1	MI	BD33	6E-05	<1	<1
EMI-1	MI	BD34	2E-05	<1	<1
EMI-1	MI	BE30	1E-05	<1	<1
EMI-1	MI	BE31	3E-05	<1	<1
EMI-1	MI	BE32	2E-05	<1	<1
EMI-1	MI	BE33	2E-05	<1	<1
EMI-1	MI	BE34	5E-05	3E+00	3E+00
EMI-1	MI	BF31	1E-04	<1	<1
EMI-1	MI	BF32	2E-05	<1	<1
EMI-1	MI	BF33	1E-05	<1	<1
EMI-1	MI	BF34	2E-05	<1	<1
EMI-1	MI	BG32	6E-06	<1	<1
EMI-1	MI	BG33	2E-05	<1	<1
EMI-1	MI	BG34	2E-05	<1	<1
EMI-1	MI	BH33	6E-06	<1	<1
EMI-1	MI	BH34	4E-06	<1	<1
EMI-1	MI	BI32	2E-05	<1	<1
EMI-1	MI	BI34	2E-04	<1	<1
EMI-1	MI	BJ33	3E-05	<1	<1
EOS-1	OS	AL35	3E-05	<1	<1
EOS-1	OS	AL36	1E-04	3E+00	<1
EOS-1	OS	AL37	2E-05	<1	<1
EOS-1	OS	AM36	1E-04	1E+01	1E+01
EOS-1	OS	AM37	1E-04	5E+00	3E+00
EOS-1	OS	AM38	6E-05	2E+00	<1
EOS-1	OS	AN36	2E-09	<1	<1
EOS-1	OS	AN37	4E-05	2E+00	2E+00
EOS-1	OS	AN38	1E-04	4E+00	3E+00
EOS-1	OS	AN39	3E-05	<1	<1
EOS-1	OS	AO37	1E-05	<1	<1
EOS-1	OS	AO39	3E-05	<1	<1
EOS-1	OS	AP38	2E-05	<1	<1
EOS-1	OS	AQ39	2E-07	<1	<1
EOS-1	OS	AQ40	3E-05	<1	<1
EOS-1	OS	AR39	1E-05	<1	<1
EOS-1	OS	AR40	2E-04	1E+01	1E+01
EOS-1	OS	AS38	2E-04	<1	<1
EOS-1	OS	AT38	3E-05	<1	<1
EOS-1	OS	AT39	3E-05	<1	<1

TABLE 5-2: TOTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SURFACE SOIL (0 TO 2 FEET BGS) (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
EOS-1	OS	AU37	9E-03	2E+03	2E+03
EOS-1	OS	AV37	5E-03	9E+02	9E+02
EOS-1	OS	AW37	2E-05	<1	<1
EOS-2	OS	AX36	2E-04	2E+00	<1
EOS-2	OS	AX37	3E-05	<1	<1
EOS-2	OS	AY36	1E-04	<1	<1
EOS-2	OS	AY37	7E-05	4E+00	3E+00
EOS-2	OS	AZ36	3E-04	3E+00	<1
EOS-2	OS	AZ37	7E-05	<1	<1
EOS-2	OS	BA36	1E-03	5E+00	3E+00
EOS-2	OS	BA37	4E-06	<1	<1
EOS-2	OS	BB36	3E-05	<1	<1
EOS-3	OS	BC36	2E-05	<1	<1
EOS-3	OS	BD35	2E-05	<1	<1
EOS-3	OS	BE35	3E-05	<1	<1
EOS-3	OS	BE36	1E-05	<1	<1
EOS-3	OS	BF35	9E-06	<1	<1
EOS-3	OS	BF36	2E-04	<1	<1
EOS-3	OS	BG35	2E-05	<1	<1
EOS-3	OS	BG36	5E-05	<1	<1
EOS-3	OS	BH36	2E-05	<1	<1
EOS-3	OS	BI35	7E-06	<1	<1
EOS-3	OS	BI36	2E-04	2E+00	<1
EOS-4	OS	AF26	1E-05	<1	<1
EOS-4	OS	AG27	9E-06	<1	<1
EOS-5	OS	ZZ01	2E-05	<1	<1

Notes: Bolded values exceed the threshold level of 1E-06 for cancer risks and 1.0 for segregated noncancer hazards.

--- Not applicable
 <1 Less than 1
 bgs Below ground surface
 HI Hazard index
 IND Industrial (industrial exposure scenario)
 MI Maritime/industrial (industrial exposure scenario)
 OS Open space (recreational exposure scenario)
 RME Reasonable maximum exposure

TABLE 5-3: TOTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
31A	MU	058073	9E-05	1E+01	7E+00
31A	MU	060074	2E-04	2E+01	7E+00
31B/36	IND	AP27	8E-06	<1	<1
31B/36	IND	AQ26	1E-05	<1	<1
31B/36	IND	AQ28	7E-06	<1	<1
31B/36	IND	AR27	8E-06	<1	<1
31B/36	IND	AR28	2E-05	<1	<1
31B/36	IND	AS26	9E-08	<1	<1
31B/36	IND	AS27	2E-05	<1	<1
31B/36	IND	AS28	1E-05	<1	<1
31B/36	IND	AS29	3E-05	<1	<1
31B/36	IND	AT26	2E-05	<1	<1
31B/36	IND	AT27	1E-05	<1	<1
31B/36	IND	AT28	7E-06	<1	<1
31B/36	IND	AT29	1E-04	<1	<1
31B/36	IND	AU28	2E-05	<1	<1
31B/36	IND	AU29	2E-04	<1	<1
31B/36	IND	AU30	9E-06	<1	<1
31B/36	IND	AU31	1E-05	<1	<1
31B/36	IND	AV29	9E-05	<1	<1
31B/36	IND	AV30	3E-05	<1	<1
40	IND	AW31	3E-05	<1	<1
40	IND	AX31	1E-05	<1	<1
40	IND	AX33	2E-05	<1	<1
40	IND	AY31	5E-06	<1	<1
40	IND	AY33	2E-05	<1	<1
40	IND	AZ32	2E-05	<1	<1
40	IND	AZ33	1E-05	<1	<1
40	IND	AZ34	1E-05	<1	<1
40	IND	BA33	4E-05	<1	<1
41	IND	AX29	2E-08	<1	<1
41	IND	AX30	2E-05	<1	<1
41	IND	AZ29	1E-05	<1	<1
41	IND	BA29	1E-05	<1	<1
41	IND	BA30	1E-05	<1	<1
41	IND	BA31	1E-05	<1	<1
41	IND	BA32	7E-06	<1	<1
41	IND	BB29	8E-06	<1	<1
41	IND	BB30	2E-05	<1	<1
41	IND	BB31	1E-05	<1	<1
43	IND	AN30	1E-05	<1	<1
43	IND	AO28	6E-08	<1	<1
43	IND	AO29	4E-06	<1	<1
43	IND	AO30	1E-05	<1	<1
43	IND	AO31	2E-05	<1	<1
43	IND	AP28	1E-05	<1	<1
43	IND	AP29	2E-04	<1	<1
43	IND	AP30	1E-05	<1	<1
43	IND	AP31	2E-05	<1	<1
43	IND	AQ29	1E-05	<1	<1
43	IND	AQ30	3E-05	<1	<1
43	IND	AQ32	1E-05	<1	<1
43	IND	AR29	8E-06	<1	<1

TABLE 5-3: TOTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS) (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
43	IND	AR30	2E-05	<1	<1
43	IND	AR31	2E-05	<1	<1
43	IND	AR32	3E-05	<1	<1
43	IND	AR33	1E-05	<1	<1
43	IND	AS30	3E-05	<1	<1
43	IND	AS31	2E-05	<1	<1
43	IND	AS32	6E-05	<1	<1
43	IND	AS33	1E-05	<1	<1
43	IND	AS34	2E-05	<1	<1
43	IND	AT30	2E-05	<1	<1
43	IND	AT31	1E-05	<1	<1
43	IND	AT32	3E-04	<1	<1
43	IND	AT33	2E-05	<1	<1
43	IND	AT34	1E-07	<1	<1
43	IND	AU32	2E-05	<1	<1
43	IND	AU33	4E-05	<1	<1
43	IND	AU34	3E-05	<1	<1
43	IND	AV32	8E-05	<1	<1
43	IND	AV33	3E-05	<1	<1
43	IND	AV34	2E-05	<1	<1
43	IND	AW33	4E-05	<1	<1
43	IND	AW34	2E-05	<1	<1
43	IND	AX34	9E-06	<1	<1
44	IND	AL32	2E-05	<1	<1
44	IND	AM31	9E-06	<1	<1
44	IND	AM32	6E-05	3E+00	3E+00
44	IND	AM33	3E-05	<1	<1
44	IND	AM34	3E-05	<1	<1
44	IND	AM35	8E-05	7E+00	6E+00
44	IND	AN31	2E-05	<1	<1
44	IND	AN32	2E-05	<1	<1
44	IND	AN33	2E-05	<1	<1
44	IND	AO35	9E-06	<1	<1
44	IND	AO36	6E-06	<1	<1
44	IND	AP32	2E-05	<1	<1
44	IND	AP33	1E-05	<1	<1
44	IND	AP34	1E-05	<1	<1
44	IND	AP35	2E-06	<1	<1
44	IND	AP36	1E-06	<1	<1
44	IND	AP37	2E-05	<1	<1
44	IND	AQ33	8E-06	<1	<1
44	IND	AQ35	6E-05	1E+01	1E+01
44	IND	AQ36	3E-05	<1	<1
44	IND	AQ37	1E-07	<1	<1
44	IND	AR34	2E-05	<1	<1
44	IND	AR35	1E-05	<1	<1
44	IND	AR36	4E-05	<1	<1
44	IND	AR37	1E-05	<1	<1
44	IND	AS36	9E-06	<1	<1
44	IND	AU35	8E-06	<1	<1
44	IND	AU36	5E-06	<1	<1
44	IND	AV36	3E-05	<1	<1
44	IND	AW35	2E-05	<1	<1

TABLE 5-3: TOTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS) (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
44	IND	AW36	2E-05	<1	<1
44	IND	AX35	1E-05	<1	<1
44	IND	AY35	3E-05	<1	<1
45	RD	032075	3E-07	1E+01	6E+00
45	RD	033077	8E-05	1E+01	7E+00
45	RD	034074	3E-07	1E+01	7E+00
45	RD	035079	4E-04	9E+00	4E+00
45	RD	036074	3E-07	1E+01	5E+00
45	RD	037074	4E-05	6E+00	2E+00
45	RD	037076	5E-05	1E+01	4E+00
45	RD	038074	3E-05	1E+01	7E+00
45	RD	038077	1E-04	1E+01	4E+00
45	RD	038079	6E-04	4E+01	2E+01
45	RD	039075	9E-05	1E+01	4E+00
45	RD	039076	4E-07	1E+01	5E+00
45	RD	039081	--	<1	<1
45	RD	040073	2E-04	1E+01	6E+00
45	RD	040074	4E-05	1E+01	7E+00
45	RD	040075	1E-04	1E+01	5E+00
45	RD	040077	2E-07	7E+00	3E+00
45	RD	040079	6E-05	8E+00	3E+00
45	RD	040082	2E-04	6E+00	2E+00
45	RD	041075	1E-04	1E+01	3E+00
45	RD	041079	8E-05	1E+01	4E+00
45	RD	041082	3E-04	2E+01	6E+00
45	RD	042073	3E-04	2E+01	5E+00
45	RD	042074	5E-05	1E+01	4E+00
45	RD	042081	3E-04	1E+01	4E+00
45	RD	042082	2E-04	2E+01	5E+00
45	RD	043075	3E-07	1E+01	5E+00
45	RD	043081	5E-04	2E+01	5E+00
45	RD	043082	2E-06	1E+01	5E+00
45	RD	044073	2E-04	1E+01	5E+00
45	RD	044079	4E-04	1E+01	5E+00
45	RD	044080	6E-05	1E+01	9E+00
45	RD	044081	1E-04	1E+01	5E+00
45	RD	045073	3E-05	9E+00	5E+00
45	RD	045074	2E-04	1E+01	4E+00
45	RD	045075	6E-05	2E+01	4E+00
45	RD	045077	9E-05	6E+00	2E+00
45	RD	045078	1E-03	1E+01	5E+00
45	RD	045080	3E-04	1E+01	6E+00
45	RD	046072	2E-04	1E+01	3E+00
45	RD	046074	8E-05	3E+01	1E+01
45	RD	046076	2E-04	1E+01	3E+00
45	RD	046077	2E-04	1E+01	6E+00
45	RD	046079	2E-04	8E+00	2E+00
45	RD	046080	3E-07	1E+01	5E+00
45	RD	046082	4E-04	6E+01	3E+01
45	RD	047074	3E-04	1E+01	6E+00
45	RD	047075	2E-05	1E+01	6E+00
45	RD	047076	1E-04	1E+01	5E+00
45	RD	047077	2E-04	1E+01	3E+00

TABLE 5-3: TOTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS) (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
45	RD	047086	8E-05	5E+00	<1
45	RD	047089	1E-04	9E+00	2E+00
45	RD	047092	2E-07	7E+00	4E+00
45	RD	048072	1E-04	1E+01	7E+00
45	RD	048075	1E-07	6E+00	3E+00
45	RD	048076	2E-07	7E+00	4E+00
45	RD	048077	3E-05	1E+01	6E+00
45	RD	048080	2E-04	8E+01	7E+01
45	RD	048089	2E-04	1E+01	3E+00
45	RD	049075	4E-05	8E+00	3E+00
45	RD	049076	3E-04	8E+00	2E+00
45	RD	049077	2E-07	9E+00	5E+00
45	RD	049079	3E-04	2E+01	5E+00
45	RD	049085	3E-07	1E+01	6E+00
45	RD	049088	3E-04	1E+01	5E+00
45	RD	049089	3E-04	1E+01	6E+00
45	RD	049091	3E-04	1E+01	6E+00
45	RD	050071	2E-07	1E+01	4E+00
45	RD	050074	2E-07	8E+00	3E+00
45	RD	050077	3E-04	1E+01	5E+00
45	RD	050080	4E-04	1E+01	5E+00
45	RD	050083	3E-08	7E+00	3E+00
45	RD	050084	2E-04	1E+01	6E+00
45	RD	050086	1E-04	6E+00	2E+00
45	RD	050088	3E-07	9E+00	6E+00
45	RD	051072	3E-05	8E+00	4E+00
45	RD	051076	2E-07	8E+00	4E+00
45	RD	051084	1E-09	<1	<1
45	RD	051085	2E-09	<1	<1
45	RD	051086	2E-07	8E+00	4E+00
45	RD	052071	4E-07	1E+01	9E+00
45	RD	052075	9E-05	2E+01	6E+00
45	RD	052082	2E-04	1E+01	3E+00
45	RD	052083	4E-04	3E+01	2E+01
45	RD	052084	3E-09	<1	<1
45	RD	052085	5E-07	1E+01	5E+00
45	RD	053080	2E-04	5E+00	2E+00
45	RD	053081	3E-04	1E+01	5E+00
45	RD	053082	2E-07	6E+00	2E+00
45	RD	053083	9E-05	9E+00	2E+00
45	RD	053085	1E-04	1E+01	6E+00
45	RD	054071	4E-07	1E+01	7E+00
45	RD	054074	1E-04	1E+01	3E+00
45	RD	054075	1E-04	1E+01	3E+00
45	RD	054077	5E-05	1E+01	4E+00
45	RD	054079	1E-04	1E+01	4E+00
45	RD	054081	1E-04	1E+01	3E+00
45	RD	055073	6E-05	1E+01	6E+00
45	RD	055078	1E-04	1E+01	5E+00
45	RD	058078	1E-07	7E+00	2E+00
45	RD	059078	1E-04	1E+01	3E+00
EMI-1	MI	AZ35	5E-06	<1	<1
EMI-1	MI	BA34	2E-05	<1	<1

TABLE 5-3: TOTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS) (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
EMI-1	MI	BA35	9E-06	<1	<1
EMI-1	MI	BB32	2E-05	<1	<1
EMI-1	MI	BB33	4E-05	<1	<1
EMI-1	MI	BB34	2E-05	<1	<1
EMI-1	MI	BB35	1E-05	<1	<1
EMI-1	MI	BC32	7E-06	<1	<1
EMI-1	MI	BC33	3E-05	<1	<1
EMI-1	MI	BC34	2E-05	<1	<1
EMI-1	MI	BC35	9E-06	<1	<1
EMI-1	MI	BD31	2E-08	<1	<1
EMI-1	MI	BD32	1E-04	<1	<1
EMI-1	MI	BD33	3E-05	<1	<1
EMI-1	MI	BD34	3E-05	<1	<1
EMI-1	MI	BE30	1E-05	<1	<1
EMI-1	MI	BE31	3E-05	<1	<1
EMI-1	MI	BE32	5E-05	<1	<1
EMI-1	MI	BE33	2E-05	<1	<1
EMI-1	MI	BE34	5E-05	3E+00	3E+00
EMI-1	MI	BF31	1E-04	<1	<1
EMI-1	MI	BF32	2E-05	<1	<1
EMI-1	MI	BF33	1E-05	<1	<1
EMI-1	MI	BF34	1E-05	<1	<1
EMI-1	MI	BG32	6E-06	<1	<1
EMI-1	MI	BG33	2E-05	<1	<1
EMI-1	MI	BG34	4E-05	<1	<1
EMI-1	MI	BH33	9E-06	<1	<1
EMI-1	MI	BH34	7E-06	<1	<1
EMI-1	MI	BI32	2E-05	<1	<1
EMI-1	MI	BI34	2E-04	<1	<1
EMI-1	MI	BJ32	2E-06	<1	<1
EMI-1	MI	BJ33	3E-05	<1	<1
EMI-1	MI	BK32	1E-05	<1	<1

Notes: Bolded values exceed the threshold level of 1E-06 for cancer risks and 1.0 for segregated noncancer hazards.

<1 Less than 1
bgs Below ground surface
HI Hazard index
IND Industrial (industrial exposure scenario)
MI Maritime/industrial (industrial exposure scenario)
MU Mixed use
RD Research and development
RME Reasonable maximum exposure

TABLE 5-4: TOTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer	RME HI	RME Segregated HI
31A	MU	AO25	2E-06	2E+00	<1
31A	MU	AP26	4E-06	2E+00	<1
31B/36	IND	AP27	2E-06	<1	<1
31B/36	IND	AQ26	3E-06	<1	<1
31B/36	IND	AQ28	2E-06	<1	<1
31B/36	IND	AR27	2E-06	2E+00	<1
31B/36	IND	AR28	6E-06	<1	<1
31B/36	IND	AS26	4E-09	<1	<1
31B/36	IND	AS27	5E-06	2E+00	<1
31B/36	IND	AS28	4E-06	2E+00	<1
31B/36	IND	AS29	8E-06	<1	<1
31B/36	IND	AT26	5E-06	<1	<1
31B/36	IND	AT27	3E-06	<1	<1
31B/36	IND	AT28	2E-06	<1	<1
31B/36	IND	AT29	3E-05	2E+00	<1
31B/36	IND	AU28	5E-06	<1	<1
31B/36	IND	AU29	7E-05	3E+00	2E+00
31B/36	IND	AU30	2E-06	<1	<1
31B/36	IND	AU31	3E-06	<1	<1
31B/36	IND	AV29	2E-05	2E+00	<1
31B/36	IND	AV30	8E-06	2E+00	<1
40	IND	AW31	7E-06	<1	<1
40	IND	AX31	4E-06	<1	<1
40	IND	AX33	6E-06	<1	<1
40	IND	AY31	1E-06	<1	<1
40	IND	AY33	5E-06	<1	<1
40	IND	AZ32	4E-06	2E+00	<1
40	IND	AZ33	3E-06	2E+00	<1
40	IND	AZ34	3E-06	2E+00	<1
40	IND	BA33	1E-05	5E+00	3E+00
41	IND	AX29	7E-10	<1	<1
41	IND	AX30	4E-06	<1	<1
41	IND	AZ29	3E-06	<1	<1
41	IND	BA29	3E-06	<1	<1
41	IND	BA30	3E-06	<1	<1
41	IND	BA31	3E-06	<1	<1
41	IND	BA32	2E-06	2E+00	<1
41	IND	BB29	2E-06	<1	<1
41	IND	BB30	5E-06	2E+00	<1
41	IND	BB31	3E-06	2E+00	<1
43	IND	AN30	3E-06	2E+00	<1
43	IND	AO28	3E-09	<1	<1
43	IND	AO29	1E-06	<1	<1
43	IND	AO30	4E-06	2E+00	<1
43	IND	AO31	4E-06	<1	<1
43	IND	AP28	3E-06	<1	<1
43	IND	AP29	6E-05	3E+00	2E+00
43	IND	AP30	3E-06	2E+00	<1
43	IND	AP31	5E-06	<1	<1
43	IND	AQ29	3E-06	<1	<1
43	IND	AQ30	8E-06	6E+00	5E+00
43	IND	AQ32	4E-06	<1	<1

TABLE 5-4: TOTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer	RME HI	RME Segregated HI
43	IND	AR29	2E-06	<1	<1
43	IND	AR30	5E-06	2E+00	<1
43	IND	AR31	5E-06	2E+00	<1
43	IND	AR32	8E-06	2E+00	<1
43	IND	AR33	4E-06	<1	<1
43	IND	AS30	7E-06	2E+00	<1
43	IND	AS31	5E-06	<1	<1
43	IND	AS32	1E-05	2E+00	<1
43	IND	AS33	3E-06	<1	<1
43	IND	AS34	5E-06	<1	<1
43	IND	AT30	4E-06	2E+00	<1
43	IND	AT31	4E-06	<1	<1
43	IND	AT32	9E-05	6E+00	2E+00
43	IND	AT33	6E-06	2E+00	<1
43	IND	AT34	5E-09	<1	<1
43	IND	AU32	6E-06	3E+00	<1
43	IND	AU33	1E-05	<1	<1
43	IND	AU34	8E-06	<1	<1
43	IND	AV32	1E-05	2E+00	<1
43	IND	AV33	6E-06	2E+00	<1
43	IND	AV34	5E-06	2E+00	<1
43	IND	AW33	1E-05	2E+00	<1
43	IND	AW34	6E-06	2E+00	<1
43	IND	AX34	2E-06	2E+00	<1
44	IND	AL32	6E-06	3E+00	2E+00
44	IND	AM31	2E-06	<1	<1
44	IND	AM32	2E-05	2E+01	2E+01
44	IND	AM33	8E-06	5E+00	2E+00
44	IND	AM34	8E-06	5E+00	3E+00
44	IND	AM35	2E-05	1E+01	6E+00
44	IND	AN31	5E-06	2E+00	<1
44	IND	AN32	4E-06	<1	<1
44	IND	AN33	6E-06	2E+00	<1
44	IND	AO35	2E-06	<1	<1
44	IND	AO36	2E-06	<1	<1
44	IND	AP32	7E-06	<1	<1
44	IND	AP33	3E-06	<1	<1
44	IND	AP34	3E-06	<1	<1
44	IND	AP35	4E-07	<1	<1
44	IND	AP36	3E-07	<1	<1
44	IND	AP37	5E-06	3E+00	2E+00
44	IND	AQ33	2E-06	<1	<1
44	IND	AQ35	8E-06	2E+01	1E+01
44	IND	AQ36	7E-06	4E+00	2E+00
44	IND	AQ37	3E-08	<1	<1
44	IND	AR34	4E-06	2E+00	<1
44	IND	AR35	3E-06	<1	<1
44	IND	AR36	1E-05	3E+00	<1
44	IND	AR37	3E-06	<1	<1
44	IND	AS36	2E-06	<1	<1
44	IND	AU35	2E-06	2E+00	<1
44	IND	AU36	1E-06	<1	<1

TABLE 5-4: TOTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer	RME HI	RME Segregated HI
44	IND	AV36	8E-06	<1	<1
44	IND	AW35	5E-06	2E+00	<1
44	IND	AW36	6E-06	<1	<1
44	IND	AX35	3E-06	<1	<1
44	IND	AY35	7E-06	2E+00	<1
45	RD	AG26	6E-09	2E+00	<1
45	RD	AH26	1E-06	2E+00	<1
45	RD	AH27	1E-05	<1	<1
45	RD	AI25	4E-06	2E+00	<1
45	RD	AI26	2E-06	2E+00	<1
45	RD	AI27	2E-05	2E+00	<1
45	RD	AI28	5E-06	<1	<1
45	RD	AJ25	7E-06	2E+00	<1
45	RD	AJ26	3E-06	2E+00	<1
45	RD	AJ27	2E-06	2E+00	<1
45	RD	AJ28	6E-06	2E+00	<1
45	RD	AK25	5E-06	2E+00	<1
45	RD	AK26	3E-06	2E+00	<1
45	RD	AK27	2E-05	2E+00	<1
45	RD	AK28	1E-05	2E+00	<1
45	RD	AL25	4E-06	2E+00	<1
45	RD	AL26	6E-06	<1	<1
45	RD	AL27	5E-06	3E+00	2E+00
45	RD	AL28	5E-06	3E+00	<1
45	RD	AL29	5E-09	<1	<1
45	RD	AL30	5E-06	<1	<1
45	RD	AL31	5E-06	2E+00	<1
45	RD	AM25	7E-07	2E+00	<1
45	RD	AM26	2E-06	2E+00	<1
45	RD	AM27	6E-06	2E+00	<1
45	RD	AM28	1E-05	2E+00	<1
45	RD	AM29	1E-05	2E+00	<1
45	RD	AM30	2E-06	<1	<1
45	RD	AN25	1E-06	2E+00	<1
45	RD	AN26	4E-06	2E+00	<1
45	RD	AN27	3E-06	<1	<1
45	RD	AN28	6E-06	2E+00	<1
45	RD	AN29	2E-06	<1	<1
45	RD	AO27	2E-09	<1	<1
EMI-1	MI	AZ35	1E-06	<1	<1
EMI-1	MI	BA34	5E-06	<1	<1
EMI-1	MI	BA35	3E-06	3E+00	<1
EMI-1	MI	BB32	4E-06	2E+00	<1
EMI-1	MI	BB33	1E-05	5E+00	3E+00
EMI-1	MI	BB34	5E-06	2E+00	<1
EMI-1	MI	BB35	4E-06	2E+00	<1
EMI-1	MI	BC32	2E-06	2E+00	<1
EMI-1	MI	BC33	7E-06	2E+00	<1
EMI-1	MI	BC34	5E-06	2E+00	<1
EMI-1	MI	BC35	2E-06	2E+00	<1
EMI-1	MI	BD31	1E-09	<1	<1
EMI-1	MI	BD32	3E-05	2E+00	<1

TABLE 5-4: TOTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer	RME HI	RME Segregated HI
EMI-1	MI	BD33	8E-06	2E+00	<1
EMI-1	MI	BD34	7E-06	3E+00	2E+00
EMI-1	MI	BE30	3E-06	<1	<1
EMI-1	MI	BE31	7E-06	2E+00	<1
EMI-1	MI	BE32	1E-05	<1	<1
EMI-1	MI	BE33	5E-06	<1	<1
EMI-1	MI	BE34	1E-05	2E+01	2E+01
EMI-1	MI	BF31	4E-05	4E+00	<1
EMI-1	MI	BF32	6E-06	<1	<1
EMI-1	MI	BF33	4E-06	<1	<1
EMI-1	MI	BF34	4E-06	<1	<1
EMI-1	MI	BG32	2E-06	<1	<1
EMI-1	MI	BG33	4E-06	<1	<1
EMI-1	MI	BG34	1E-05	<1	<1
EMI-1	MI	BH33	2E-06	<1	<1
EMI-1	MI	BH34	2E-06	<1	<1
EMI-1	MI	BI32	5E-06	<1	<1
EMI-1	MI	BI34	5E-05	2E+00	<1
EMI-1	MI	BJ32	5E-07	<1	<1
EMI-1	MI	BJ33	7E-06	2E+00	<1
EMI-1	MI	BK32	4E-06	<1	<1
EOS-1	OS	AL35	1E-05	3E+00	<1
EOS-1	OS	AL36	3E-05	8E+00	3E+00
EOS-1	OS	AL37	6E-06	2E+00	<1
EOS-1	OS	AM36	2E-05	2E+01	1E+01
EOS-1	OS	AM37	3E-05	1E+01	8E+00
EOS-1	OS	AM38	1E-05	3E+00	<1
EOS-1	OS	AN36	7E-06	2E+00	<1
EOS-1	OS	AN37	1E-04	3E+02	2E+02
EOS-1	OS	AN38	4E-05	1E+01	6E+00
EOS-1	OS	AN39	6E-06	3E+00	<1
EOS-1	OS	AO37	7E-06	2E+00	<1
EOS-1	OS	AO39	9E-06	7E+00	3E+00
EOS-1	OS	AP38	1E-05	2E+01	1E+01
EOS-1	OS	AQ39	8E-06	<1	<1
EOS-1	OS	AQ40	6E-06	2E+00	<1
EOS-1	OS	AR39	3E-06	<1	<1
EOS-1	OS	AR40	2E-05	7E+00	6E+00
EOS-1	OS	AS38	2E-05	2E+00	<1
EOS-1	OS	AT38	1E-05	3E+00	<1
EOS-1	OS	AT39	8E-06	<1	<1
EOS-1	OS	AU37	4E-04	7E+02	7E+02
EOS-1	OS	AV37	2E-04	3E+02	3E+02
EOS-1	OS	AW37	6E-06	<1	<1
EOS-2	OS	AX36	1E-05	4E+00	<1
EOS-2	OS	AX37	8E-06	2E+00	<1
EOS-2	OS	AY36	6E-05	3E+01	2E+01
EOS-2	OS	AY37	1E-05	5E+00	2E+00
EOS-2	OS	AZ36	5E-05	5E+00	2E+00
EOS-2	OS	AZ37	1E-05	4E+00	<1
EOS-2	OS	BA36	4E-05	3E+00	<1
EOS-2	OS	BA37	7E-07	<1	<1

TABLE 5-4: TOTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer	RME HI	RME Segregated HI
EOS-2	OS	BB36	6E-06	2E+00	<1
EOS-3	OS	BC36	6E-06	<1	<1
EOS-3	OS	BD35	4E-06	2E+00	<1
EOS-3	OS	BE35	7E-06	2E+00	<1
EOS-3	OS	BE36	2E-05	3E+00	<1
EOS-3	OS	BF35	5E-06	<1	<1
EOS-3	OS	BF36	3E-05	<1	<1
EOS-3	OS	BG35	7E-06	<1	<1
EOS-3	OS	BG36	1E-05	2E+00	<1
EOS-3	OS	BG37	4E-05	5E+00	2E+00
EOS-3	OS	BH36	1E-05	1E+01	5E+00
EOS-3	OS	BH37	2E-05	2E+00	<1
EOS-3	OS	BI35	3E-06	<1	<1
EOS-3	OS	BI36	1E-05	2E+00	<1
EOS-3	OS	BI37	2E-05	7E+00	3E+00
EOS-3	OS	BJ36	2E-05	5E+00	2E+00
EOS-4	OS	AF26	3E-06	<1	<1
EOS-4	OS	AG27	2E-06	2E+00	<1
EOS-5	OS	ZZ01	1E-05	<1	<1

Notes: Bolded values exceed the threshold level of 1E-06 for cancer risks and 1.0 for segregated noncancer hazards.

<1 Less than 1
bgs Below ground surface
HI Hazard index
IND Industrial (industrial exposure scenario)
MI Maritime/industrial (industrial exposure scenario)
MU Mixed use (residential exposure scenario)
OS Open space (recreational exposure scenario)
RD Research and development
RME Reasonable maximum exposure

TABLE 5-5: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) BY PLANNED REUSE
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals	
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?
31B/36	IND	AR27	4E-06	<1	<1	Metal	Arsenic	C	1.8 - 1.8	1.80E+00	1/1	4.15E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
31B/36	IND	AR28	1E-05	<1	<1	Metal	Arsenic	C	1.4 - 4.9	4.90E+00	2/5	1.13E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
31B/36	IND	AS27	4E-06	<1	<1	Metal	Arsenic	C	1.5 - 1.5	1.50E+00	1/1	3.46E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
31B/36	IND	AS28	2E-05	<1	<1	Metal	Arsenic	C	4.1 - 6.5	6.50E+00	3/3	1.50E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
31B/36	IND	AS29	3E-05	<1	<1	Metal	Arsenic	C	1.7 - 8	8.00E+00	6/10	1.84E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	1.2 - 1.2	1.20E+00	1/9	6.83E-06	36.8	63.2	0.0		--	--	--	--		--	--
31B/36	IND	AT27	1E-05	<1	<1	Metal	Arsenic	C	3.1 - 5.8	5.80E+00	2/2	1.34E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
31B/36	IND	AT28	1E-05	<1	<1	Metal	Arsenic	C	3.4 - 4.2	4.20E+00	2/2	9.68E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
31B/36	IND	AT29	3E-04	<1	<1	Metal	Arsenic	C	11 - 130	1.30E+02	2/2	3.00E-04	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.24 - 0.24	2.40E-01	1/2	1.37E-06	36.8	63.2	0.0		--	--	--	--		--	--
31B/36	IND	AU28	2E-05	<1	<1	Metal	Arsenic	C	1.7 - 7.6	7.60E+00	3/3	1.75E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						VOC	Naphthalene	C	0.058 - 5.7	5.70E+00	3/3	1.22E-06	9.8	0.0	90.2		<1	--	--	--		--	--
31B/36	IND	AU29	2E-04	<1	<1	Metal	Arsenic	C	7.2 - 105	7.88E+01	7/7	1.82E-04	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.065 - 0.8	8.00E-01	4/7	4.56E-06	36.8	63.2	0.0		--	--	--	--		--	--
							Benzo(b)fluoranthene	C	0.23 - 2.1	2.10E+00	4/6	1.20E-06	36.8	63.2	0.0		--	--	--	--		--	--
31B/36	IND	AU31	6E-06	<1	<1	Metal	Arsenic	C	2.5 - 2.5	2.50E+00	1/1	5.76E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
31B/36	IND	AV29	1E-04	<1	<1	Metal	Arsenic	C	2.4 - 50.9	5.09E+01	7/8	1.17E-04	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						VOC	Naphthalene	C	6.6 - 6.6	6.60E+00	1/11	1.42E-06	9.8	0.0	90.2		<1	--	--	--		--	--
31B/36	IND	AV30	5E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.45 - 0.45	4.50E-01	1/2	2.56E-06	36.8	63.2	0.0		--	--	--	--		--	--
40	IND	AW31	3E-05	<1	<1	Metal	Arsenic	C	12.3 - 12.3	1.23E+01	1/1	2.84E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
40	IND	AX33	1E-05	<1	<1	Metal	Arsenic	C	4.5 - 4.5	4.50E+00	1/1	1.04E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
40	IND	AZ33	2E-05	<1	<1	Metal	Arsenic	C	2.6 - 7.1	7.10E+00	2/2	1.64E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
40	IND	AZ34	2E-05	<1	<1	Metal	Arsenic	C	2.4 - 7.4	7.40E+00	3/3	1.71E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
40	IND	BA33	2E-05	<1	<1	Metal	Arsenic	C	2.8 - 7.8	6.88E+00	6/7	1.59E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						Pest/PCB	Aroclor-1254	C	3.4 - 3.4	3.40E+00	1/7	3.38E-06	35.1	64.9	0.0		<1	--	--	--		--	--
							Aroclor-1260	C	2.8 - 2.8	2.80E+00	1/7	2.79E-06	35.1	64.9	0.0		<1	--	--	--		--	--
41	IND	BA29	2E-05	<1	<1	Metal	Arsenic	C	0.66 - 8.5	6.58E+00	5/5	1.52E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
41	IND	BA30	1E-05	<1	<1	Metal	Arsenic	C	2 - 5.8	5.41E+00	5/5	1.25E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.16 - 0.23	2.30E-01	2/5	1.31E-06	36.8	63.2	0.0		--	--	--	--		--	--
41	IND	BA31	8E-06	<1	<1	Metal	Arsenic	C	3.6 - 3.6	3.60E+00	1/1	8.30E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
41	IND	BA32	7E-06	<1	<1	Metal	Arsenic	C	3.1 - 3.1	3.10E+00	1/1	7.15E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
41	IND	BB29	2E-05	<1	<1	Metal	Arsenic	C	0.8 - 7.9	7.61E+00	4/4	1.75E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
41	IND	BB30	5E-05	<1	<1	Metal	Arsenic	C	3.5 - 8	8.00E+00	3/3	1.84E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.055 - 4.8	2.80E+00	4/11	1.60E-05	36.8	63.2	0.0		--	--	--	--		--	--
							Benzo(b)fluoranthene	C	0.023 - 9.4	9.40E+00	6/11	5.35E-06	36.8	63.2	0.0		--	--	--	--		--	--
							Benzo(k)fluoranthene	C	0.023 - 2.3	2.30E+00	2/11	1.31E-06	36.8	63.2	0.0		--	--	--	--		--	--
							Dibenz(a,h)anthracene	C	1 - 1	1.00E+00	1/11	3.46E-06	36.8	63.2	0.0		--	--	--	--		--	--
							Indeno(1,2,3-cd)pyrene	C	0.032 - 2.8	2.80E+00	2/11	1.59E-06	36.8	63.2	0.0		--	--	--	--		--	--
41	IND	BB31	1E-05	<1	<1	Metal	Arsenic	C	5.6 - 5.6	5.60E+00	1/1	1.29E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
43	IND	AN30	2E-05	<1	<1	Metal	Arsenic	C	0.44 - 7.2	7.20E+00	4/4	1.66E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
43	IND	AO29	4E-06	<1	<1	Metal	Arsenic	C	1.7 - 1.7	1.70E+00	1/1	3.92E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
43	IND	AO30	2E-05	<1	<1	Metal	Arsenic	C	1.5 - 6.3	4.90E+00	8/9	1.13E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						Pest/PCB	Aroclor-1260	C	0.77 - 6.8	4.12E+00	5/9	4.10E-06	35.1	64.9	0.0		<1	--	--	--		--	--
43	IND	AO31	2E-05	<1	<1	Metal	Arsenic	C	3 - 7.8	7.80E+00	3/3	1.80E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
43	IND	AP29	2E-04	<1	<1	Metal	Arsenic	C	2.8 - 244	9.09E+01	6/8	2.10E-04	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.038 - 0.21	1.89E-01	4/8	1.08E-06	36.8	63.2	0.0		--	--	--	--		--	--
43	IND	AP30	2E-05	<1	<1	Metal	Arsenic	C	0.8 - 9.9	9.88E+00	4/4	2.28E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
43	IND	AP31	2E-05	<1	<1	Metal	Arsenic	C	4.6 - 9.2	9.20E+00	2/3	2.12E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.2 - 0.2	2.00E-01	1/3	1.14E-06	36.8	63.2	0.0		--	--	--	--		--	--
43	IND	AQ30	3E-05	<1	<1	Metal	Arsenic	C	4.3 - 6	6.00E+00	3/3	1.38E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.068 - 0.37	3.70E-01	3/7	2.11E-06	36.8	63.2	0.0		--	--	--	--		--	--
						Pest/PCB	Aroclor-1260	C	0.55 - 14	1.40E+01	6/8	1.39E-05	35.1	64.9	0.0		<1	--	--	--		--	--
43	IND	AQ32	2E-06	<1	<1	Metal	Arsenic	C	0.45 - 0.65	6.50E-01	2/2	1.50E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
43	IND	AR29	7E-06	<1	<1	Metal	Arsenic	C	1.9 - 3.1	3.10E+00	2/2	7.15E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
43	IND	AR30	1E-05	<1	<1	Metal	Arsenic	C	5.6 - 5.6	5.60E+00	1/1	1.29E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Revised Parcel E RI Report

TABLE 5-5: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals	
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?
44	IND	AN32	2E-05	<1	<1	Metal	Arsenic	C	3.2 - 6.9	6.90E+00	2/2	1.59E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AN33	3E-05	<1	<1	Metal	Arsenic	C	2 - 7.3	6.87E+00	6/6	1.58E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.19 - 1	1.00E+00	2/6	5.70E-06	36.8	63.2	0.0		--	--	--		--	--	
						Pest/PCB	Aroclor-1260	C	1.6 - 1.6	1.60E+00	1/6	1.59E-06	35.1	64.9	0.0		<1	--	--	--		--	--
44	IND	AO35	8E-06	<1	<1	Metal	Arsenic	C	3.3 - 3.3	3.30E+00	1/1	7.61E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AP34	1E-05	<1	<1	Metal	Arsenic	C	3.3 - 4.7	4.70E+00	2/2	1.08E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.19 - 0.19	1.90E-01	1/2	1.08E-06	36.8	63.2	0.0		--	--	--		--	--	
44	IND	AP37	3E-05	<1	<1	Metal	Arsenic	C	3.8 - 8.9	8.90E+00	2/5	2.05E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						Pest/PCB	Aroclor-1254	C	1.3 - 1.3	1.30E+00	1/5	1.29E-06	35.1	64.9	0.0		<1	--	--	--		--	--
							Aroclor-1260	C	0.044 - 4.3	4.30E+00	3/5	4.28E-06	35.1	64.9	0.0		<1	--	--	--		--	--
44	IND	AQ33	8E-06	<1	<1	Metal	Arsenic	C	3.6 - 3.6	3.60E+00	1/1	8.30E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AQ35	1E-05	<1	<1	Metal	Arsenic	C	4.4 - 4.9	4.90E+00	2/4	1.13E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.38 - 0.38	3.80E-01	1/4	2.16E-06	36.8	63.2	0.0		--	--	--		--	--	
44	IND	AQ36	3E-05	<1	<1	Metal	Arsenic	C	2.6 - 16	1.15E+01	5/7	2.64E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
44	IND	AR34	1E-05	<1	<1	Metal	Arsenic	C	6.1 - 6.1	6.10E+00	1/1	1.41E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AR35	2E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.23 - 0.23	2.30E-01	1/1	1.31E-06	36.8	63.2	0.0		--	--	--		--	--	
44	IND	AR36	1E-05	<1	<1	Metal	Arsenic	C	2 - 3.4	3.34E+00	4/6	7.70E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.22 - 0.22	2.20E-01	1/4	1.25E-06	36.8	63.2	0.0		--	--	--		--	--	
44	IND	AR37	8E-06	<1	<1	Metal	Arsenic	C	2.7 - 2.7	2.70E+00	1/1	6.23E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AS36	8E-06	<1	<1	Metal	Arsenic	C	3.3 - 3.3	3.30E+00	1/1	7.61E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AU35	8E-06	<1	<1	Metal	Arsenic	C	3.5 - 3.5	3.50E+00	1/1	8.07E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AU36	5E-06	<1	<1	Metal	Arsenic	C	2.2 - 2.2	2.20E+00	1/1	5.07E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AV36	3E-05	<1	<1	Metal	Arsenic	C	9.2 - 15	1.50E+01	5/5	3.46E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
44	IND	AW36	2E-05	<1	<1	Metal	Arsenic	C	2.1 - 8.6	6.36E+00	6/6	1.47E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AX35	1E-05	<1	<1	Metal	Arsenic	C	4.5 - 4.5	4.50E+00	1/1	1.04E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AY35	3E-05	<1	<1	Metal	Arsenic	C	11.9 - 11.9	1.19E+01	1/1	2.74E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
45	RD	032075	2E-07	1E+01	5E+00	Metal	Iron	NC	44000 - 44000	4.40E+04	1/1	--	--	--	--	--	2.00E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	1100 - 1100	1.10E+03	1/1	--	--	--	--	--	1.30E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	1420 - 1420	1.42E+03	1/1	--	--	--	--	--	4.70E+00	19.3	0.0	1.0	79.6	*	No
45	RD	033077	8E-05	1E+01	7E+00	Metal	Arsenic	C	3.2 - 3.2	3.20E+00	1/1	8.36E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	25500 - 25500	2.55E+04	1/1	--	--	--	--	--	1.16E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	6040 - 6040	6.04E+03	1/1	--	--	--	--	--	7.16E+00	44.9	0.0	2.9	52.2	1431	Yes
45	RD	034074	2E-07	9E+00	5E+00	Metal	Iron	NC	45500 - 45500	4.55E+04	1/1	--	--	--	--	--	2.07E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	897 - 897	8.97E+02	1/1	--	--	--	--	--	1.06E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	1440 - 1440	1.44E+03	1/1	--	--	--	--	--	4.77E+00	19.3	0.0	1.0	79.6	*	No
45	RD	035079	4E-04	5E+00	2E+00	Metal	Arsenic	C/NC	16.5 - 16.5	1.65E+01	1/1	4.31E-04	56.6	5.4	0.0	38.0	1.05E+00	66.8	5.6	0.1	27.5	11.1	Yes
							Iron	NC	34900 - 34900	3.49E+04	1/1	--	--	--	--	--	1.59E+00	93.6	0.0	0.0	6.4	58000	No
45	RD	036074	1E-07	1E+01	3E+00	Metal	Iron	NC	64100 - 64100	6.41E+04	1/1	--	--	--	--	--	2.92E+00	93.6	0.0	0.0	6.4	58000	Yes
							Manganese	NC	1560 - 1560	1.56E+03	1/1	--	--	--	--	--	1.85E+00	44.9	0.0	2.9	52.2	1431	Yes
							Nickel	NC	397 - 397	3.97E+02	1/1	--	--	--	--	--	1.31E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	191 - 191	1.91E+02	1/1	--	--	--	--	--	2.95E+00	82.9	0.0	0.0	17.1	117.17	Yes
45	RD	037076	5E-05	7E+00	4E+00	Metal	Arsenic	C	2 - 2	2.00E+00	1/1	5.22E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	29000 - 29000	2.90E+04	1/1	--	--	--	--	--	1.32E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	2840 - 2840	2.84E+03	1/1	--	--	--	--	--	3.37E+00	44.9	0.0	2.9	52.2	1431	Yes
45	RD	038074	3E-07	1E+01	5E+00	Metal	Iron	NC	59200 - 59200	5.92E+04	1/1	--	--	--	--	--	2.70E+00	93.6	0.0	0.0	6.4	58000	Yes
							Manganese	NC	919 - 919	9.19E+02	1/1	--	--	--	--	--	1.09E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	1660 - 1660	1.66E+03	1/1	--	--	--	--	--	5.49E+00	19.3	0.0	1.0	79.6	*	No
							Thallium	NC	5.7 - 5.7	5.70E+00	1/1	--	--	--	--	--	1.13E+00	97.3	0.0	0.0	2.7	0.81	Yes
							Vanadium	NC	76.4 - 76.4	7.64E+01	1/1	--	--	--	--	--	1.18E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	038079	6E-04	3E+01	2E+01	Metal	Antimony	NC	38.4 - 38.4	3.84E+01	1/2	--	--	--	--	--	3.76E+00	32.7	0.0	0.0	67.3	9.05	Yes
							Arsenic	C/NC	10.7 - 21.8	2.18E+01	2/2	5.69E-04	56.6	5.4	0.0	38.0	1.39E+00	66.8	5.6	0.1	27.5	11.1	Yes
							Cadmium	NC	8.2 - 8.2	8.20E+00	1/2	--	--	--	--	--	2.37E+00	8.8	0.0	0.0	91.1	3.14	Yes
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TABLE 5-5: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals			
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?		
45	RD	038079	6E-04	3E+01	2E+01	PAH	Benzo(a)anthracene	C	0.55 - 0.55	5.50E-01	1/2	1.49E-06	69.5	28.5	0.0	2.0	--	--	--	--	--	--		
							Benzo(a)pyrene	C	0.76 - 0.76	7.60E-01	1/2	2.04E-05	70.1	28.8	0.0	1.1	--	--	--	--	--	--		
							Benzo(b)fluoranthene	C	1.2 - 1.2	1.20E+00	1/2	3.55E-06	63.6	26.1	0.0	10.3	--	--	--	--	--	--		
						Pest/PCB	Aroclor-1260	C	0.58 - 0.58	5.80E-01	1/2	2.75E-06	66.1	29.2	0.0	4.7	<1	--	--	--	--	--	--	
							SVOC	Bis(2-ethylhexyl)phthalate	C	5.4 - 5.4	5.40E+00	1/2	4.73E-06	2.5	0.8	0.0	96.7	<1	--	--	--	--	--	--
45	RD	040073	3E-07	1E+01	6E+00	Metal	Iron	NC	49700 - 49700	4.97E+04	1/1	--	--	--	--	2.26E+00	93.6	0.0	0.0	6.4	58000	No		
							Nickel	NC	1930 - 1930	1.93E+03	1/1	--	--	--	--	6.39E+00	19.3	0.0	1.0	79.6	*	No		
45	RD	040074	4E-05	5E+00	2E+00	Metal	Arsenic	C	1.4 - 1.4	1.40E+00	1/1	3.66E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No	
							Iron	NC	36300 - 36300	3.63E+04	1/1	--	--	--	--	1.65E+00	93.6	0.0	0.0	6.4	58000	No		
							Vanadium	NC	91.9 - 91.9	9.19E+01	1/1	--	--	--	--	1.42E+00	82.9	0.0	0.0	17.1	117.17	No		
45	RD	040075	1E-04	8E+00	5E+00	Metal	Arsenic	C	4.7 - 4.7	4.70E+00	1/1	1.23E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No	
							Manganese	NC	4390 - 4390	4.39E+03	1/1	--	--	--	--	5.21E+00	44.9	0.0	2.9	52.2	1431	Yes		
45	RD	040082	2E-04	3E+00	<1	Metal	Arsenic	C	8 - 8	8.00E+00	1/1	2.09E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No	
45	RD	041082	2E-04	6E+00	<1	Metal	Arsenic	C	6.2 - 6.2	6.20E+00	1/1	1.62E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	--	11.1	No
							Iron	NC	31500 - 31500	3.15E+04	1/1	--	--	--	--	1.43E+00	93.6	0.0	0.0	6.4	58000	No		
							Vanadium	NC	67.5 - 67.5	6.75E+01	1/1	--	--	--	--	1.04E+00	82.9	0.0	0.0	17.1	117.17	No		
							PAH	Benzo(a)anthracene	C	0.59 - 0.59	5.90E-01	1/1	1.60E-06	69.5	28.5	0.0	2.0	--	--	--	--	--	--	--
						Benzo(a)pyrene		C	0.94 - 0.94	9.40E-01	1/1	2.52E-05	70.1	28.8	0.0	1.1	--	--	--	--	--	--	--	
						Benzo(b)fluoranthene		C	1.2 - 1.2	1.20E+00	1/1	3.55E-06	63.6	26.1	0.0	10.3	--	--	--	--	--	--		
						Benzo(k)fluoranthene		C	0.47 - 0.47	4.70E-01	1/1	1.39E-06	63.6	26.1	0.0	10.3	--	--	--	--	--	--		
						Indeno(1,2,3-cd)pyrene		C	0.6 - 0.6	6.00E-01	1/1	1.73E-06	65.3	26.8	0.0	8.0	--	--	--	--	--	--		
						Pest/PCB	Dieldrin	C	0.005 - 0.005	5.00E-03	1/1	7.58E-06	1.7	0.5	0.0	97.8	<1	--	--	--	--	--	--	
						Metal	Arsenic	C	3.8 - 6.2	6.20E+00	2/2	1.62E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	--	11.1	No
							Iron	NC	23400 - 46500	4.65E+04	2/2	--	--	--	--	--	2.12E+00	93.6	0.0	0.0	6.4	58000	No	
							Manganese	NC	843 - 2530	2.53E+03	2/2	--	--	--	--	--	3.00E+00	44.9	0.0	2.9	52.2	1431	Yes	
							Nickel	NC	106 - 769	7.69E+02	2/2	--	--	--	--	--	2.55E+00	19.3	0.0	1.0	79.6	*	No	
Thallium	NC	7.1 - 7.1	7.10E+00	1/2	--		--	--	--	--	1.41E+00	97.3	0.0	0.0	2.7	0.81	Yes							
Vanadium	NC	68.6 - 87.2	8.72E+01	2/2	--		--	--	--	--	1.34E+00	82.9	0.0	0.0	17.1	117.17	No							
Metal	Arsenic	C/NC	16.3 - 16.3	1.63E+01	1/2	4.26E-04	56.6	5.4	0.0	38.0	1.04E+00	66.8	5.6	0.1	27.5	11.1	Yes							
	Iron	NC	29500 - 37500	3.75E+04	2/2	--	--	--	--	--	1.71E+00	93.6	0.0	0.0	6.4	58000	No							
	Manganese	NC	883 - 1390	1.39E+03	2/2	--	--	--	--	--	1.65E+00	44.9	0.0	2.9	52.2	1431	No							
	Nickel	NC	28.9 - 1370	1.37E+03	2/2	--	--	--	--	--	4.53E+00	19.3	0.0	1.0	79.6	*	No							
	Antimony	NC	11.9 - 11.9	1.19E+01	1/1	--	--	--	--	--	1.16E+00	32.7	0.0	0.0	67.3	9.05	Yes							
	Arsenic	C	7.5 - 7.5	7.50E+00	1/1	1.96E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No							
	Copper	NC	771 - 771	7.71E+02	1/1	--	--	--	--	--	4.84E+00	5.5	0.0	0.0	94.5	124.31	Yes							
	Iron	NC	46000 - 46000	4.60E+04	1/1	--	--	--	--	--	2.09E+00	93.6	0.0	0.0	6.4	58000	No							
Metal	Lead	--	321 - 321	3.21E+02	1/1	--	--	--	--	--	--	--	--	--	--	--	8.99	Yes						
	Manganese	NC	1130 - 1130	1.13E+03	1/1	--	--	--	--	--	1.34E+00	44.9	0.0	2.9	52.2	1431	No							
	Vanadium	NC	85.9 - 85.9	8.59E+01	1/1	--	--	--	--	--	1.32E+00	82.9	0.0	0.0	17.1	117.17	No							
	Zinc	NC	794 - 794	7.94E+02	1/1	--	--	--	--	--	2.13E+00	1.6	0.0	0.0	98.4	109.86	Yes							
	PAH	Benzo(a)anthracene	C	1.3 - 1.3	1.30E+00	1/1	3.51E-06	69.5	28.5	0.0	2.0	--	--	--	--	--	--	--						
		Benzo(a)pyrene	C	0.79 - 0.79	7.90E-01	1/1	2.12E-05	70.1	28.8	0.0	1.1	--	--	--	--	--	--	--						
		Benzo(b)fluoranthene	C	2.5 - 2.5	2.50E+00	1/1	7.39E-06	63.6	26.1	0.0	10.3	--	--	--	--	--	--							
		Benzo(k)fluoranthene	C	0.75 - 0.75	7.50E-01	1/1	2.22E-06	63.6	26.1	0.0	10.3	--	--	--	--	--	--							
Dibenz(a,h)anthracene		C	0.14 - 0.14	1.40E-01	1/1	2.42E-06	66.2	27.2	0.0	6.7	--	--	--	--	--	--								
Indeno(1,2,3-cd)pyrene	C	0.45 - 0.45	4.50E-01	1/1	1.30E-06	65.3	26.8	0.0	8.0	--	--	--	--	--	--									
Pest/PCB	Aroclor-1260	C	0.82 - 0.82	8.20E-01	1/1	3.89E-06	66.1	29.2	0.0	4.7	<1	--	--	--	--	--	--							
45	RD	043081	5E-04	1E+01	7E+00	Metal	Arsenic	C/NC	17.9 - 17.9	1.79E+01	1/2	4.68E-04	56.6	5.4	0.0	38.0	1.14E+00	66.8	5.6	0.1	27.5	11.1	Yes	
							Iron	NC	44600 - 49900	4.99E+04	2/2	--	--	--	--	--	2.27E+00	93.6	0.0	0.0	6.4	58000	No	
							Manganese	NC	886 - 1090	1.09E+03	2/2	--	--	--	--	--	1.29E+00	44.9	0.0	2.9	52.2	1431	No	
							Nickel	NC	33.9 - 2050	2.05E+03	2/2	--	--	--	--	--	6.79E+00	19.3	0.0	1.0	79.6	*	No	
							Vanadium	NC	52.7 - 67	6.70E+01	2/2	--	--	--	--	--	1.03E+00	82.9	0.0	0.0	17.1	117.17	No	
45	RD	043082	2E-07	1E+01	5E+00	Metal	Iron	NC	37800 - 37800	3.78E+04	1/1	--	--	--	--	1.72E+00	93.6	0.0	0.0	6.4	58000	No		
							Nickel	NC	1590 - 1590	1.59E+03	1/1	--	--	--	--	--	5.26E+00	19.3	0.0	1.0	79.6	*	No	
45	RD	044073	2E-04	7E+00	2E+00	Metal	Arsenic	C	7.4 - 7.4	7.40E+00	1/1	1.93E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No	
							Iron	NC	33800 - 33800	3.38E+04	1/1	--	--	--	--	--	1.54E+00	93.6	0.0	0.0	6.4	58000	No	
							Nickel	NC	359 - 359	3.59E+02	1/1	--	--	--	--	--	1.19E+00	19.3	0.0	1.0	79.6	*	No	
							Thallium	NC	5.6 - 5.6	5.60E+00	1/1	--	--	--	--	--	1.11E+00	97.3	0.0	0.0	2.7	0.81	Yes	
							Vanadium	NC	79.2 - 79.2	7.92E+01	1/1	--	--	--	--	--	1.22E+00	82.9	0.0	0.0	17.1	117.17	No	

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals		
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?	
45	RD	044079	4E-04	1E+01	4E+00	Metal	Arsenic	C	14.3 - 14.3	1.43E+01	1/2	3.74E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	Yes	
					Iron		NC	35500 - 36700	3.67E+04	2/2	--	--	--	--	--	--	--	1.67E+00	93.6	0.0	0.0	6.4	58000	No
					Manganese		NC	994 - 2440	2.44E+03	2/2	--	--	--	--	--	--	--	2.89E+00	44.9	0.0	2.9	52.2	1431	Yes
					Nickel		NC	25.3 - 1300	1.30E+03	2/2	--	--	--	--	--	--	--	4.30E+00	19.3	0.0	1.0	79.6	*	No
45	RD	044080	6E-05	7E+00	3E+00	Metal	Arsenic	C	2.1 - 2.1	2.10E+00	1/1	5.49E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No	
					Iron		NC	39900 - 39900	3.99E+04	1/1	--	--	--	--	--	--	--	1.82E+00	93.6	0.0	0.0	6.4	58000	No
					Nickel		NC	863 - 863	8.63E+02	1/1	--	--	--	--	--	--	--	2.86E+00	19.3	0.0	1.0	79.6	*	No
45	RD	044081	3E-07	1E+01	5E+00	Metal	Iron	NC	46700 - 46700	4.67E+04	1/1	--	--	--	--	--	2.13E+00	93.6	0.0	0.0	6.4	58000	No	
					Manganese		NC	989 - 989	9.89E+02	1/1	--	--	--	--	--	--	--	1.17E+00	44.9	0.0	2.9	52.2	1431	No
					Nickel		NC	1460 - 1460	1.46E+03	1/1	--	--	--	--	--	--	--	4.83E+00	19.3	0.0	1.0	79.6	*	No
45	RD	045073	3E-05	3E+00	<1	Metal	Arsenic	C	1.3 - 1.3	1.30E+00	1/1	3.40E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No	
45	RD	045074	7E-05	1E+01	3E+00	Metal	Arsenic	C	1.6 - 2.4	2.40E+00	2/2	6.27E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No	
					Iron		NC	14600 - 41900	4.19E+04	2/2	--	--	--	--	--	--	--	1.91E+00	93.6	0.0	0.0	6.4	58000	No
					Manganese		NC	925 - 2630	2.63E+03	2/2	--	--	--	--	--	--	--	3.12E+00	44.9	0.0	2.9	52.2	1431	Yes
					Nickel		NC	29.1 - 989	9.89E+02	2/2	--	--	--	--	--	--	--	3.27E+00	19.3	0.0	1.0	79.6	*	No
						PAH	Benzo(a)pyrene	C	0.22 - 0.22	2.20E-01	1/2	5.90E-06	70.1	28.8	0.0	1.1	--	--	--	--	--	--	--	
					Benzo(b)fluoranthene		C	0.54 - 0.54	5.40E-01	1/2	1.60E-06	63.6	26.1	0.0	10.3	--	--	--	--	--	--	--	--	
					Benzo(k)fluoranthene		C	0.56 - 0.56	5.60E-01	1/2	1.66E-06	63.6	26.1	0.0	10.3	--	--	--	--	--	--	--	--	
					Indeno(1,2,3-cd)pyrene		C	0.41 - 0.41	4.10E-01	1/2	1.18E-06	65.3	26.8	0.0	8.0	--	--	--	--	--	--	--	--	
45	RD	045075	5E-05	7E+00	3E+00	Metal	Arsenic	C	2.1 - 2.1	2.10E+00	1/1	5.49E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No	
					Copper		NC	170 - 170	1.70E+02	1/1	--	--	--	--	--	--	--	1.07E+00	5.5	0.0	0.0	94.5	124.31	Yes
					Iron		NC	26200 - 26200	2.62E+04	1/1	--	--	--	--	--	--	--	1.19E+00	93.6	0.0	0.0	6.4	58000	No
					Manganese		NC	2500 - 2500	2.50E+03	1/1	--	--	--	--	--	--	--	2.97E+00	44.9	0.0	2.9	52.2	1431	Yes
45	RD	045078	2E-07	8E+00	5E+00	Metal	Iron	NC	29300 - 29300	2.93E+04	1/1	--	--	--	--	--	1.33E+00	93.6	0.0	0.0	6.4	58000	No	
					Nickel		NC	1530 - 1530	1.53E+03	1/1	--	--	--	--	--	--	--	5.06E+00	19.3	0.0	1.0	79.6	*	No
45	RD	045080	3E-05	1E+01	6E+00	Metal	Arsenic	C	1.2 - 1.2	1.20E+00	1/1	3.13E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No	
					Iron		NC	56100 - 56100	5.61E+04	1/1	--	--	--	--	--	--	--	2.55E+00	93.6	0.0	0.0	6.4	58000	No
					Manganese		NC	1100 - 1100	1.10E+03	1/1	--	--	--	--	--	--	--	1.30E+00	44.9	0.0	2.9	52.2	1431	No
					Nickel		NC	1710 - 1710	1.71E+03	1/1	--	--	--	--	--	--	--	5.66E+00	19.3	0.0	1.0	79.6	*	No
					Vanadium		NC	67.4 - 67.4	6.74E+01	1/1	--	--	--	--	--	--	--	1.04E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	046072	2E-04	1E+01	3E+00	Metal	Arsenic	C	6 - 6	6.00E+00	1/1	1.57E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No	
					Iron		NC	52000 - 52000	5.20E+04	1/1	--	--	--	--	--	--	--	2.37E+00	93.6	0.0	0.0	6.4	58000	No
					Manganese		NC	1080 - 1080	1.08E+03	1/1	--	--	--	--	--	--	--	1.28E+00	44.9	0.0	2.9	52.2	1431	No
					Nickel		NC	769 - 769	7.69E+02	1/1	--	--	--	--	--	--	--	2.55E+00	19.3	0.0	1.0	79.6	*	No
					Thallium		NC	7.1 - 7.1	7.10E+00	1/1	--	--	--	--	--	--	--	1.41E+00	97.3	0.0	0.0	2.7	0.81	Yes
					Vanadium		NC	117 - 117	1.17E+02	1/1	--	--	--	--	--	--	--	1.80E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	046074	8E-05	2E+01	1E+01	Metal	Arsenic	C	2.8 - 2.8	2.80E+00	1/1	7.31E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No	
					Copper		NC	536 - 536	5.36E+02	1/1	--	--	--	--	--	--	--	3.37E+00	5.5	0.0	0.0	94.5	124.31	Yes
					Iron		NC	25900 - 25900	2.59E+04	1/1	--	--	--	--	--	--	--	1.18E+00	93.6	0.0	0.0	6.4	58000	No
					Mercury		NC	17.5 - 17.5	1.75E+01	1/1	--	--	--	--	--	--	--	1.10E+01	6.8	0.0	0.0	93.2	2.28	Yes
					Zinc		NC	567 - 567	5.67E+02	1/1	--	--	--	--	--	--	--	1.52E+00	1.6	0.0	0.0	98.4	109.86	Yes
						PAH	Benzo(a)pyrene	C	0.04 - 0.04	4.00E-02	1/1	1.07E-06	70.1	28.8	0.0	1.1	--	--	--	--	--	--	--	
45	RD	046076	1E-04	1E+01	3E+00	Metal	Arsenic	C	3.5 - 4.1	4.10E+00	2/2	1.07E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No	
					Iron		NC	39900 - 48700	4.87E+04	2/2	--	--	--	--	--	--	--	2.22E+00	93.6	0.0	0.0	6.4	58000	No
					Manganese		NC	799 - 1180	1.18E+03	2/2	--	--	--	--	--	--	--	1.40E+00	44.9	0.0	2.9	52.2	1431	No
					Nickel		NC	341 - 798	7.98E+02	2/2	--	--	--	--	--	--	--	2.64E+00	19.3	0.0	1.0	79.6	*	No
					Vanadium		NC	62.5 - 113	1.13E+02	2/2	--	--	--	--	--	--	--	1.74E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	046077	9E-05	9E+00	4E+00	Metal	Arsenic	C	3.5 - 3.5	3.50E+00	1/2	9.14E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No	
					Iron		NC	23600 - 39500	3.95E+04	2/2	--	--	--	--	--	--	--	1.80E+00	93.6	0.0	0.0	6.4	58000	No
					Nickel		NC	702 - 1110	1.11E+03	2/2	--	--	--	--	--	--	--	3.67E+00	19.3	0.0	1.0	79.6	*	No
45	RD	046079	8E-05	8E+00	2E+00	Metal	Arsenic	C	2.9 - 2.9	2.90E+00	1/1	7.58E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No	
					Iron		NC	44000 - 44000	4.40E+04	1/1	--	--	--	--	--	--	--	2.00E+00	93.6	0.0	0.0	6.4	58000	No
					Manganese		NC	864 - 864	8.64E+02	1/1	--	--	--	--	--	--	--	1.02E+00	44.9	0.0	2.9	52.2	1431	No
					Nickel		NC	668 - 668	6.68E+02	1/1	--	--	--	--	--	--	--	2.21E+00	19.3	0.0	1.0	79.6	*	No
					Vanadium		NC	88.3 - 88.3	8.83E+01	1/1	--	--	--	--	--	--	--	1.36E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	046080	3E-07	1E+01	5E+00	Metal	Iron	NC	45400 - 45400	4.54E+04	1/1	--	--	--	--	--	2.07E+00	93.6	0.0	0.0	6.4	58000	No	
					Manganese		NC	939 - 939	9.39E+02	1/1	--	--	--	--	--	--	--	1.11E+00	44.9	0.0	2.9	52.2	1431	No
					Nickel		NC	1490 - 1490	1.49E+03	1/1	--	--	--	--	--	--	--	4.93E+00	19.3	0.0	1.0	79.6	*	No

TABLE 5-5: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals		
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?	
45	RD	046082	3E-04	5E+01	3E+01	Metal	Antimony	NC	22.3 - 22.3	2.23E+01	1/1	--	--	--	--	2.18E+00	32.7	0.0	0.0	67.3	9.05	Yes	
							Arsenic	C	9.8 - 9.8	9.80E+00	1/1	2.56E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Copper	NC	5230 - 5230	5.23E+03	1/1	--	--	--	--	--	3.29E+01	5.5	0.0	0.0	94.5	124.31	Yes
							Iron	NC	49900 - 49900	4.99E+04	1/1	--	--	--	--	--	2.27E+00	93.6	0.0	0.0	6.4	58000	No
							Lead	--	4850 - 4850	4.85E+03	1/1	--	--	--	--	--	--	--	--	--	--	8.99	Yes
							Manganese	NC	986 - 986	9.86E+02	1/1	--	--	--	--	--	1.17E+00	44.9	0.0	2.9	52.2	1431	No
							Mercury	NC	3.7 - 3.7	3.70E+00	1/1	--	--	--	--	--	2.33E+00	6.8	0.0	0.0	93.2	2.28	Yes
							Zinc	NC	2220 - 2220	2.22E+03	1/1	--	--	--	--	--	5.95E+00	1.6	0.0	0.0	98.4	109.86	Yes
						Pest/PCB	Aroclor-1260	C/NC	1.4 - 1.4	1.40E+00	1/1	6.63E-06	66.1	29.2	0.0	4.7	1.29E+00	69.6	27.3	0.0	3.1	--	--
45	RD	047076	9E-05	6E+00	2E+00	Metal	Arsenic	C	3.4 - 3.4	3.40E+00	1/2	8.88E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	13900 - 36000	3.60E+04	2/2	--	--	--	--	--	1.64E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	213 - 894	8.94E+02	2/2	--	--	--	--	--	1.06E+00	44.9	0.0	2.9	52.2	1431	No
							Vanadium	NC	36.5 - 67.8	6.78E+01	2/2	--	--	--	--	--	1.05E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	047077	2E-04	6E+00	2E+00	Metal	Arsenic	C	7.7 - 8.6	8.60E+00	2/2	2.25E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	39500 - 42700	4.27E+04	2/2	--	--	--	--	--	1.94E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	1060 - 1270	1.27E+03	2/2	--	--	--	--	--	1.51E+00	44.9	0.0	2.9	52.2	1431	No
							Vanadium	NC	55 - 65.8	6.58E+01	2/2	--	--	--	--	--	1.01E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	047086	8E-05	5E+00	<1	Metal	Arsenic	C	3.1 - 3.1	3.10E+00	1/1	8.10E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	25600 - 25600	2.56E+04	1/1	--	--	--	--	--	1.17E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	1040 - 1040	1.04E+03	1/1	--	--	--	--	--	1.23E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	347 - 347	3.47E+02	1/1	--	--	--	--	--	1.15E+00	19.3	0.0	1.0	79.6	*	No
45	RD	047089	1E-04	9E+00	2E+00	Metal	Arsenic	C	5.4 - 5.4	5.40E+00	1/1	1.41E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Copper	NC	188 - 188	1.88E+02	1/1	--	--	--	--	--	1.18E+00	5.5	0.0	0.0	94.5	124.31	Yes
							Iron	NC	41100 - 41100	4.11E+04	1/1	--	--	--	--	--	1.87E+00	93.6	0.0	0.0	6.4	58000	No
							Lead	--	1080 - 1080	1.08E+03	1/1	--	--	--	--	--	--	--	--	--	--	8.99	Yes
							Manganese	NC	991 - 991	9.91E+02	1/1	--	--	--	--	--	1.18E+00	44.9	0.0	2.9	52.2	1431	No
							Zinc	NC	401 - 401	4.01E+02	1/1	--	--	--	--	--	1.07E+00	1.6	0.0	0.0	98.4	109.86	Yes
						Pest/PCB	Aroclor-1260	C	0.75 - 0.75	7.50E-01	1/1	3.55E-06	66.1	29.2	0.0	4.7	<1	--	--	--	--	--	--
45	RD	047092	2E-07	7E+00	4E+00	Metal	Iron	NC	36400 - 36400	3.64E+04	1/1	--	--	--	--	--	1.66E+00	93.6	0.0	0.0	6.4	58000	No
							Lead	--	187 - 187	1.87E+02	1/1	--	--	--	--	--	--	--	--	--	--	8.99	Yes
							Nickel	NC	1110 - 1110	1.11E+03	1/1	--	--	--	--	--	3.67E+00	19.3	0.0	1.0	79.6	*	No
45	RD	048072	7E-05	1E+01	8E+00	Metal	Arsenic	C	2 - 2	2.00E+00	1/2	5.22E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	12200 - 61100	6.11E+04	2/2	--	--	--	--	--	2.78E+00	93.6	0.0	0.0	6.4	58000	Yes
							Manganese	NC	219 - 1030	1.03E+03	2/2	--	--	--	--	--	1.22E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	34.5 - 2400	2.40E+03	2/2	--	--	--	--	--	7.94E+00	19.3	0.0	1.0	79.6	*	No
						PAH	Benzo(a)pyrene	C	0.46 - 0.46	4.60E-01	1/2	1.23E-05	70.1	28.8	0.0	1.1	--	--	--	--	--	--	--
45	RD	048080	2E-04	8E+01	7E+01	Metal	Antimony	NC	29 - 29	2.90E+01	1/1	--	--	--	--	--	2.84E+00	32.7	0.0	0.0	67.3	9.05	Yes
							Arsenic	C	7.8 - 7.8	7.80E+00	1/1	2.04E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Copper	NC	10400 - 10400	1.04E+04	1/1	--	--	--	--	--	6.53E+01	5.5	0.0	0.0	94.5	124.31	Yes
							Iron	NC	32400 - 32400	3.24E+04	1/1	--	--	--	--	--	1.48E+00	93.6	0.0	0.0	6.4	58000	No
							Lead	--	1900 - 1900	1.90E+03	1/1	--	--	--	--	--	--	--	--	--	--	8.99	Yes
							Nickel	NC	323 - 323	3.23E+02	1/1	--	--	--	--	--	1.07E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	74 - 74	7.40E+01	1/1	--	--	--	--	--	1.14E+00	82.9	0.0	0.0	17.1	117.17	No
							Zinc	NC	784 - 784	7.84E+02	1/1	--	--	--	--	--	2.10E+00	1.6	0.0	0.0	98.4	109.86	Yes
						Pest/PCB	Aroclor-1260	C/NC	1.4 - 1.4	1.40E+00	1/1	6.63E-06	66.1	29.2	0.0	4.7	1.29E+00	69.6	27.3	0.0	3.1	--	--
45	RD	049079	2E-04	1E+01	4E+00	Metal	Arsenic	C	7 - 7	7.00E+00	1/1	1.83E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Cadmium	NC	4 - 4	4.00E+00	1/1	--	--	--	--	--	1.16E+00	8.8	0.0	0.0	91.1	3.14	Yes
							Copper	NC	619 - 619	6.19E+02	1/1	--	--	--	--	--	3.89E+00	5.5	0.0	0.0	94.5	124.31	Yes
							Iron	NC	28400 - 28400	2.84E+04	1/1	--	--	--	--	--	1.29E+00	93.6	0.0	0.0	6.4	58000	No
							Lead	--	1070 - 1070	1.07E+03	1/1	--	--	--	--	--	--	--	--	--	--	8.99	Yes
						Pest/PCB	Aroclor-1260	C/NC	3.3 - 3.3	3.30E+00	1/1	1.56E-05	66.1	29.2	0.0	4.7	3.03E+00	69.6	27.3	0.0	3.1	--	--
45	RD	049085	2E-07	9E+00	5E+00	Metal	Iron	NC	44600 - 44600	4.46E+04	1/1	--	--	--	--	--	2.03E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	1080 - 1080	1.08E+03	1/1	--	--	--	--	--	1.28E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	1490 - 1490	1.49E+03	1/1	--	--	--	--	--	4.93E+00	19.3	0.0	1.0	79.6	*	No
45	RD	049088	3E-07	9E+00	6E+00	Metal	Iron	NC	37000 - 37000	3.70E+04	1/1	--	--	--	--	--	1.68E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	1740 - 1740	1.74E+03	1/1	--	--	--	--	--	5.76E+00	19.3	0.0	1.0	79.6	*	No
45	RD	049091	1E-04	8E+00	3E+00	Metal	Arsenic	C	4.8 - 4.8	4.80E+00	1/1	1.25E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	43200 - 43200	4.32E+04	1/1	--	--	--	--	--	1.97E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	852 - 852	8.52E+02	1/1	--	--	--	--	--	2.82E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	73.8 - 73.8	7.38E+01	1/1	--	--	--	--	--	1.14E+00	82.9	0.0	0.0	17.1	117.17	No

TABLE 5-5: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals	
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?
45	RD	050071	2E-07	9E+00	4E+00	Metal	Iron	NC	47000 - 47000	4.70E+04	1/1	--	--	--	--	2.14E+00	93.6	0.0	0.0	6.4	58000	No	
							Manganese	NC	1270 - 1270	1.27E+03	1/1	--	--	--	--	1.51E+00	44.9	0.0	2.9	52.2	1431	No	
							Nickel	NC	1270 - 1270	1.27E+03	1/1	--	--	--	--	4.20E+00	19.3	0.0	1.0	79.6	*	No	
							Vanadium	NC	66.3 - 66.3	6.63E+01	1/1	--	--	--	--	1.02E+00	82.9	0.0	0.0	17.1	117.17	No	
45	RD	050077	3E-04	7E+00	2E+00	Metal	Arsenic	C	9.7 - 9.7	9.70E+00	1/1	2.53E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Nickel	NC	344 - 344	3.44E+02	1/1	--	--	--	--	1.14E+00	19.3	0.0	1.0	79.6	*	No	
							Vanadium	NC	121 - 121	1.21E+02	1/1	--	--	--	--	1.87E+00	82.9	0.0	0.0	17.1	117.17	Yes	
						Pest/PCB	Aroclor-1260	C/NC	1.1 - 1.1	1.10E+00	1/1	5.21E-06	66.1	29.2	0.0	4.7	1.01E+00	69.6	27.3	0.0	3.1	--	--
45	RD	050083	3E-08	7E+00	3E+00	Metal	Iron	NC	38300 - 38300	3.83E+04	1/1	--	--	--	--	1.74E+00	93.6	0.0	0.0	6.4	58000	No	
							Mercury	NC	2.3 - 2.3	2.30E+00	1/1	--	--	--	--	1.45E+00	6.8	0.0	0.0	93.2	2.28	Yes	
							Vanadium	NC	114 - 114	1.14E+02	1/1	--	--	--	--	1.76E+00	82.9	0.0	0.0	17.1	117.17	No	
45	RD	050086	1E-04	6E+00	2E+00	Metal	Arsenic	C	3.8 - 3.8	3.80E+00	1/1	9.93E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	32500 - 32500	3.25E+04	1/1	--	--	--	--	1.48E+00	93.6	0.0	0.0	6.4	58000	No	
							Nickel	NC	660 - 660	6.60E+02	1/1	--	--	--	--	2.18E+00	19.3	0.0	1.0	79.6	*	No	
						SVOC	Pentachlorophenol	C	10 - 10	1.00E+01	1/1	3.85E-06	48.8	38.5	0.0	12.6	<1	--	--	--	--	--	--
45	RD	050088	3E-07	9E+00	6E+00	Metal	Iron	NC	43400 - 43400	4.34E+04	1/1	--	--	--	--	1.98E+00	93.6	0.0	0.0	6.4	58000	No	
							Nickel	NC	1770 - 1770	1.77E+03	1/1	--	--	--	--	5.86E+00	19.3	0.0	1.0	79.6	*	No	
45	RD	052071	4E-07	1E+01	9E+00	Metal	Iron	NC	45800 - 45800	4.58E+04	1/1	--	--	--	--	2.09E+00	93.6	0.0	0.0	6.4	58000	No	
							Nickel	NC	2690 - 2690	2.69E+03	1/1	--	--	--	--	8.90E+00	19.3	0.0	1.0	79.6	*	No	
45	RD	052075	3E-05	1E+01	6E+00	Metal	Arsenic	C	1.1 - 1.1	1.10E+00	1/1	2.87E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	44600 - 44600	4.46E+04	1/1	--	--	--	--	2.03E+00	93.6	0.0	0.0	6.4	58000	No	
							Manganese	NC	920 - 920	9.20E+02	1/1	--	--	--	--	1.09E+00	44.9	0.0	2.9	52.2	1431	No	
							Nickel	NC	1880 - 1880	1.88E+03	1/1	--	--	--	--	6.22E+00	19.3	0.0	1.0	79.6	*	No	
45	RD	052082	5E-07	9E+00	4E+00	Metal	Iron	NC	51800 - 51800	5.18E+04	1/1	--	--	--	--	2.36E+00	93.6	0.0	0.0	6.4	58000	No	
							Manganese	NC	1010 - 1010	1.01E+03	1/1	--	--	--	--	1.20E+00	44.9	0.0	2.9	52.2	1431	No	
							Nickel	NC	1060 - 1060	1.06E+03	1/1	--	--	--	--	3.51E+00	19.3	0.0	1.0	79.6	*	No	
							Vanadium	NC	99.9 - 99.9	9.99E+01	1/1	--	--	--	--	1.54E+00	82.9	0.0	0.0	17.1	117.17	No	
45	RD	052085	1E-07	6E+00	2E+00	Metal	Iron	NC	29600 - 29600	2.96E+04	1/1	--	--	--	--	1.35E+00	93.6	0.0	0.0	6.4	58000	No	
							Manganese	NC	1590 - 1590	1.59E+03	1/1	--	--	--	--	1.89E+00	44.9	0.0	2.9	52.2	1431	Yes	
							Nickel	NC	324 - 324	3.24E+02	1/1	--	--	--	--	1.07E+00	19.3	0.0	1.0	79.6	*	No	
							Vanadium	NC	75.2 - 75.2	7.52E+01	1/1	--	--	--	--	1.16E+00	82.9	0.0	0.0	17.1	117.17	No	
45	RD	053080	2E-04	5E+00	2E+00	Metal	Arsenic	C	6.6 - 6.6	6.60E+00	1/1	1.72E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	39100 - 39100	3.91E+04	1/1	--	--	--	--	1.78E+00	93.6	0.0	0.0	6.4	58000	No	
							Manganese	NC	972 - 972	9.72E+02	1/1	--	--	--	--	1.15E+00	44.9	0.0	2.9	52.2	1431	No	
45	RD	053081	2E-07	1E+01	4E+00	Metal	Cadmium	NC	11.3 - 11.3	1.13E+01	1/1	--	--	--	--	3.27E+00	8.8	0.0	0.0	91.1	3.14	Yes	
							Iron	NC	37000 - 37000	3.70E+04	1/1	--	--	--	--	1.68E+00	93.6	0.0	0.0	6.4	58000	No	
							Nickel	NC	1040 - 1040	1.04E+03	1/1	--	--	--	--	3.44E+00	19.3	0.0	1.0	79.6	*	No	
45	RD	053082	2E-07	6E+00	2E+00	Metal	Iron	NC	37100 - 37100	3.71E+04	1/1	--	--	--	--	1.69E+00	93.6	0.0	0.0	6.4	58000	No	
							Nickel	NC	420 - 420	4.20E+02	1/1	--	--	--	--	1.39E+00	19.3	0.0	1.0	79.6	*	No	
							Vanadium	NC	82.6 - 82.6	8.26E+01	1/1	--	--	--	--	1.27E+00	82.9	0.0	0.0	17.1	117.17	No	
45	RD	053083	5E-05	7E+00	2E+00	Metal	Arsenic	C	1.9 - 1.9	1.90E+00	1/1	4.96E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	33400 - 33400	3.34E+04	1/1	--	--	--	--	1.52E+00	93.6	0.0	0.0	6.4	58000	No	
							Manganese	NC	869 - 869	8.69E+02	1/1	--	--	--	--	1.03E+00	44.9	0.0	2.9	52.2	1431	No	
							Nickel	NC	527 - 527	5.27E+02	1/1	--	--	--	--	1.74E+00	19.3	0.0	1.0	79.6	*	No	
							Vanadium	NC	72.8 - 72.8	7.28E+01	1/1	--	--	--	--	1.12E+00	82.9	0.0	0.0	17.1	117.17	No	
45	RD	053085	6E-05	7E+00	<1	Metal	Arsenic	C	2 - 2	2.00E+00	2/2	5.22E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	21600 - 28700	2.87E+04	2/2	--	--	--	--	1.31E+00	93.6	0.0	0.0	6.4	58000	No	
							Lead	--	12.5 - 169	1.69E+02	2/2	--	--	--	--	--	--	--	--	--	8.99	Yes	
							Nickel	NC	25.2 - 411	4.11E+02	2/2	--	--	--	--	1.36E+00	19.3	0.0	1.0	79.6	*	No	
						SVOC	Bis(2-ethylhexyl)phthalate	C	3.6 - 3.6	3.60E+00	1/2	3.15E-06	2.5	0.8	0.0	96.7	<1	--	--	--	--	--	--
45	RD	054071	8E-08	7E+00	2E+00	Metal	Iron	NC	52500 - 52500	5.25E+04	1/1	--	--	--	--	2.39E+00	93.6	0.0	0.0	6.4	58000	No	
							Manganese	NC	1200 - 1200	1.20E+03	1/1	--	--	--	--	1.42E+00	44.9	0.0	2.9	52.2	1431	No	
							Vanadium	NC	109 - 109	1.09E+02	1/1	--	--	--	--	1.68E+00	82.9	0.0	0.0	17.1	117.17	No	
45	RD	054074	1E-04	5E+00	<1	Metal	Arsenic	C	3.9 - 3.9	3.90E+00	1/1	1.02E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	26200 - 26200	2.62E+04	1/1	--	--	--	--	1.19E+00	93.6	0.0	0.0	6.4	58000	No	
							Lead	--	597 - 597	5.97E+02	1/1	--	--	--	--	--	--	--	--	--	8.99	Yes	
						Pest/PCB	Aroclor-1260	C	0.32 - 0.32	3.20E-01	1/1	1.52E-06	66.1	29.2	0.0	4.7	<1	--	--	--	--	--	--
45	RD	054075	1E-04	5E+00	2E+00	Metal	Arsenic	C	4.2 - 4.2	4.20E+00	1/1	1.10E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	33400 - 33400	3.34E+04	1/1	--	--	--	--	1.52E+00	93.6	0.0	0.0	6.4	58000	No	
							Vanadium	NC	78.6 - 78.6	7.86E+01	1/1	--	--	--	--	1.21E+00	82.9	0.0	0.0	17.1	117.17	No	

TABLE 5-5: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals	
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?
45	RD	054077	5E-05	9E+00	4E+00	Metal	Arsenic	C	2 - 2	2.00E+00	1/1	5.22E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	42000 - 42000	4.20E+04	1/1	--	--	--	--	--	1.91E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	1080 - 1080	1.08E+03	1/1	--	--	--	--	--	3.58E+00	19.3	0.0	1.0	79.6	*	No
							Thallium	NC	6.8 - 6.8	6.80E+00	1/1	--	--	--	--	--	1.35E+00	97.3	0.0	0.0	2.7	0.81	Yes
45	RD	054079	4E-05	9E+00	4E+00	Metal	Arsenic	C	1.6 - 1.6	1.60E+00	1/1	4.18E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	40000 - 40000	4.00E+04	1/1	--	--	--	--	--	1.82E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	1060 - 1060	1.06E+03	1/1	--	--	--	--	--	3.51E+00	19.3	0.0	1.0	79.6	*	No
45	RD	054081	4E-05	8E+00	3E+00	Metal	Arsenic	C	1.6 - 1.6	1.60E+00	1/1	4.18E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	36100 - 36100	3.61E+04	1/1	--	--	--	--	--	1.64E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	1890 - 1890	1.89E+03	1/1	--	--	--	--	--	2.24E+00	44.9	0.0	2.9	52.2	1431	Yes
							Nickel	NC	820 - 820	8.20E+02	1/1	--	--	--	--	--	2.71E+00	19.3	0.0	1.0	79.6	*	No
45	RD	055073	3E-07	1E+01	6E+00	Metal	Iron	NC	47100 - 47100	4.71E+04	1/1	--	--	--	--	--	2.14E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	942 - 942	9.42E+02	1/1	--	--	--	--	--	1.12E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	1730 - 1730	1.73E+03	1/1	--	--	--	--	--	5.73E+00	19.3	0.0	1.0	79.6	*	No
45	RD	059078	3E-07	9E+00	3E+00	Metal	Iron	NC	40000 - 51000	5.10E+04	2/2	--	--	--	--	--	2.32E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	743 - 1230	1.23E+03	2/2	--	--	--	--	--	1.46E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	583 - 973	9.73E+02	2/2	--	--	--	--	--	3.22E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	75.6 - 91.3	9.13E+01	2/2	--	--	--	--	--	1.41E+00	82.9	0.0	0.0	17.1	117.17	No
EMI-1	MI	AZ35	5E-06	<1	<1	Metal	Arsenic	C	1.5 - 1.5	1.50E+00	1/1	3.46E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BA34	3E-05	<1	<1	Metal	Arsenic	C	2.8 - 9.9	9.90E+00	3/4	2.28E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.052 - 0.46	4.60E-01	3/10	2.62E-06	36.8	63.2	0.0		--	--	--	--		--	--
EMI-1	MI	BA35	3E-06	<1	<1	Metal	Arsenic	C	0.84 - 1.4	1.40E+00	2/2	3.23E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BB32	2E-05	<1	<1	Metal	Arsenic	C	3.8 - 3.8	3.80E+00	1/5	8.76E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.043 - 0.6	6.00E-01	2/6	3.42E-06	36.8	63.2	0.0		--	--	--	--		--	--
						Pest/PCB	Aroclor-1260	C	0.019 - 1.5	1.50E+00	3/6	1.49E-06	35.1	64.9	0.0		<1	--	--	--		--	--
EMI-1	MI	BB33	3E-05	<1	<1	Metal	Arsenic	C	2.7 - 11	8.69E+00	5/6	2.00E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.13 - 0.38	3.80E-01	2/11	2.16E-06	36.8	63.2	0.0		--	--	--	--		--	--
						Pest/PCB	Aroclor-1254	C	6.9 - 6.9	6.90E+00	1/11	6.87E-06	35.1	64.9	0.0		<1	--	--	--		--	--
EMI-1	MI	BB34	3E-05	<1	<1	Metal	Arsenic	C	3.4 - 14.5	8.89E+00	6/14	2.05E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.014 - 0.31	3.10E-01	8/16	1.77E-06	36.8	63.2	0.0		--	--	--	--		--	--
						Pest/PCB	Aroclor-1260	C	0.02 - 1.6	1.60E+00	3/9	1.59E-06	35.1	64.9	0.0		<1	--	--	--		--	--
EMI-1	MI	BB35	7E-06	<1	<1	Metal	Arsenic	C	3 - 3	3.00E+00	1/1	6.92E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BC32	7E-06	<1	<1	Metal	Arsenic	C	3.2 - 3.2	3.20E+00	1/1	7.38E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BC33	1E-05	<1	<1	Metal	Arsenic	C	0.59 - 4.3	4.30E+00	3/4	9.92E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.068 - 0.29	2.90E-01	2/14	1.65E-06	36.8	63.2	0.0		--	--	--	--		--	--
EMI-1	MI	BC34	4E-06	<1	<1	Metal	Arsenic	C	1.4 - 1.4	1.40E+00	1/2	3.23E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BD32	3E-05	<1	<1	Metal	Arsenic	C	3.5 - 12	1.20E+01	3/5	2.77E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
EMI-1	MI	BD33	6E-05	<1	<1	Metal	Arsenic	C	3.5 - 62	2.54E+01	12/12	5.87E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						Lead		--	5.5 - 1420	1.42E+03	11/13	--	--	--	--		--	--	--	--	8.99	Yes	
EMI-1	MI	BD34	2E-05	<1	<1	Metal	Arsenic	C	0.84 - 14.5	8.32E+00	7/9	1.92E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						Pest/PCB	Aroclor-1254	C	0.46 - 3.3	3.30E+00	2/6	3.28E-06	35.1	64.9	0.0		<1	--	--	--		--	--
EMI-1	MI	BE30	1E-05	<1	<1	Metal	Arsenic	C	3.6 - 5.1	4.72E+00	4/6	1.09E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BE31	3E-05	<1	<1	Metal	Arsenic	C	7.9 - 12	1.20E+01	2/2	2.77E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
EMI-1	MI	BE32	2E-05	<1	<1	Metal	Arsenic	C	3.2 - 8.8	7.10E+00	5/6	1.64E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.096 - 0.85	8.50E-01	2/6	4.84E-06	36.8	63.2	0.0		--	--	--	--		--	--
EMI-1	MI	BE33	2E-05	<1	<1	Metal	Arsenic	C	1.6 - 11	6.16E+00	21/21	1.42E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BE34	5E-05	3E+00	3E+00	Metal	Arsenic	C	2.5 - 11.8	6.93E+00	7/11	1.60E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						Pest/PCB	Aroclor-1254	C/NC	30 - 38	3.80E+01	2/11	3.78E-05	35.1	64.9	0.0		2.65E+00	35.1	64.9	0.0		--	--
EMI-1	MI	BF31	1E-04	<1	<1	Metal	Arsenic	C	4.4 - 45	4.50E+01	3/3	1.04E-04	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						Lead		--	35.6 - 4300	4.30E+03	3/3	--	--	--	--		--	--	--	--	8.99	Yes	
EMI-1	MI	BF32	2E-05	<1	<1	Metal	Arsenic	C	5.5 - 9.7	9.70E+00	2/2	2.24E-05	71.6	28.4	0.0		<1	--	--	--		11.	

TABLE 5-5: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) BY PLANNED REUSE (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

													Percent Contribution by Exposure Pathway to Total RME Cancer Risk					Percent Contribution by Exposure Pathway to Total RME HI				Metals	
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Chemical-Specific HI	Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL
Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	Chemical-Specific HI	Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?
EMI-1	MI	BH33	6E-06	<1	<1	Metal	Arsenic	C	1.6 - 2.3	2.30E+00	2/4	5.30E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BH34	4E-06	<1	<1	Metal	Arsenic	C	1.7 - 1.7	1.70E+00	1/1	3.92E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BI32	2E-05	<1	<1	Metal	Arsenic	C	9.4 - 9.4	9.40E+00	1/1	2.17E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BI34	2E-04	<1	<1	Metal	Arsenic	C	3.6 - 99.5	9.95E+01	2/5	2.29E-04	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
							Lead	--	8.7 - 1340	1.34E+03	3/5	--	--	--	--		--	--	--	--		8.99	Yes
						PAH	Benzo(a)pyrene	C	0.21 - 0.21	2.10E-01	1/4	1.20E-06	36.8	63.2	0.0		--	--	--	--		--	--
EMI-1	MI	BJ33	3E-05	<1	<1	Metal	Arsenic	C	12.1 - 12.1	1.21E+01	1/1	2.79E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
EOS-1	OS	AL35	3E-05	<1	<1	Metal	Arsenic	C	6.9 - 12	1.20E+01	2/2	3.23E-05	62.8	37.2	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.17 - 0.17	1.70E-01	1/2	1.30E-06	28.0	71.9	0.0		--	--	--	--		--	--
EOS-1	OS	AL36	1E-04	3E+00	<1	Metal	Arsenic	C	2.9 - 31	3.10E+01	2/5	8.34E-05	62.8	37.2	0.0		<1	--	--	--		11.1	Yes
							Lead	--	28 - 470	4.13E+02	5/5	--	--	--	--		--	--	--	--		8.99	Yes
						PAH	Benzo(a)anthracene	C	2.7 - 2.7	2.70E+00	1/5	2.07E-06	28.0	71.9	0.0		--	--	--	--		--	--
							Benzo(a)pyrene	C	0.25 - 2.5	2.50E+00	2/5	1.91E-05	28.0	71.9	0.0		--	--	--	--		--	--
							Benzo(b)fluoranthene	C	0.085 - 3.5	3.50E+00	2/5	2.68E-06	28.0	71.9	0.0		--	--	--	--		--	--
							Benzo(k)fluoranthene	C	1.7 - 1.7	1.70E+00	1/5	1.30E-06	28.0	71.9	0.0		--	--	--	--		--	--
							Indeno(1,2,3-cd)pyrene	C	0.17 - 1.4	1.40E+00	2/5	1.07E-06	28.0	71.9	0.0		--	--	--	--		--	--
EOS-1	OS	AL37	2E-05	<1	<1	Pest/PCB	Aroclor-1260	C/NC	0.13 - 5.5	5.50E+00	4/5	7.40E-06	26.6	73.4	0.0		1.39E+00	29.0	71.0	0.0		--	--
EOS-1	OS	AM36	1E-04	1E+01	1E+01	Metal	Arsenic	C	8.6 - 8.6	8.60E+00	1/1	2.31E-05	62.8	37.2	0.0		<1	--	--	--		11.1	No
						Metal	Arsenic	C	8.4 - 18	1.80E+01	3/6	4.85E-05	62.8	37.2	0.0		<1	--	--	--		11.1	Yes
							Lead	--	38 - 700	5.72E+02	5/6	--	--	--	--		--	--	--	--		8.99	Yes
						PAH	Benzo(a)pyrene	C	0.045 - 0.15	1.50E-01	2/6	1.15E-06	28.0	71.9	0.0		--	--	--	--		--	--
						Pest/PCB	Aroclor-1260	C/NC	0.15 - 40	4.00E+01	3/6	5.39E-05	26.6	73.4	0.0		1.01E+01	29.0	71.0	0.0		--	--
EOS-1	OS	AM37	1E-04	5E+00	3E+00	Metal	Arsenic	C	6.2 - 12	1.20E+01	3/4	3.23E-05	62.8	37.2	0.0		<1	--	--	--		11.1	Yes
							Lead	--	270 - 871	8.65E+02	4/4	--	--	--	--		--	--	--	--		8.99	Yes
						PAH	Benzo(a)anthracene	C	0.52 - 20	2.00E+01	3/4	1.53E-05	28.0	71.9	0.0		--	--	--	--		--	--
							Benzo(a)pyrene	C	0.1 - 3.5	3.50E+00	3/4	2.68E-05	28.0	71.9	0.0		--	--	--	--		--	--
							Benzo(b)fluoranthene	C	0.15 - 6.5	6.50E+00	3/4	4.98E-06	28.0	71.9	0.0		--	--	--	--		--	--
							Chrysene	C	0.58 - 20	2.00E+01	3/4	1.53E-06	28.0	71.9	0.0		--	--	--	--		--	--
							Dibenz(a,h)anthracene	C	0.61 - 0.61	6.10E-01	1/4	2.84E-06	28.0	71.9	0.0		--	--	--	--		--	--
							Indeno(1,2,3-cd)pyrene	C	0.38 - 2.3	2.30E+00	2/4	1.76E-06	28.0	71.9	0.0		--	--	--	--		--	--
EOS-1	OS	AM38	6E-05	2E+00	<1	Pest/PCB	Aroclor-1260	C/NC	0.074 - 12	1.20E+01	4/4	1.62E-05	26.6	73.4	0.0		3.02E+00	29.0	71.0	0.0		--	--
						Metal	Arsenic	C	5.2 - 19.2	1.92E+01	2/3	5.17E-05	62.8	37.2	0.0		<1	--	--	--		11.1	Yes
							Lead	--	19.2 - 1180	1.18E+03	3/3	--	--	--	--		--	--	--	--		8.99	Yes
						PAH	Benzo(a)pyrene	C	0.33 - 0.33	3.30E-01	1/3	2.53E-06	28.0	71.9	0.0		--	--	--	--		--	--
						Pest/PCB	Aroclor-1260	C	0.5 - 1.3	1.30E+00	2/3	1.75E-06	26.6	73.4	0.0		<1	--	--	--		--	--
EOS-1	OS	AN37	4E-05	2E+00	2E+00	Metal	Arsenic	C	4.4 - 6.8	6.80E+00	3/3	1.83E-05	62.8	37.2	0.0		<1	--	--	--		11.1	No
							Lead	--	509 - 4810	4.81E+03	3/3	--	--	--	--		--	--	--	--		8.99	Yes
						PAH	Benzo(a)pyrene	C	0.17 - 0.86	8.60E-01	3/4	6.58E-06	28.0	71.9	0.0		--	--	--	--		--	--
							Benzo(b)fluoranthene	C	0.41 - 1.5	1.50E+00	3/4	1.15E-06	28.0	71.9	0.0		--	--	--	--		--	--
						Pest/PCB	Aroclor-1260	C/NC	0.7 - 6.4	5.61E+00	4/4	7.56E-06	26.6	73.4	0.0		1.41E+00	29.0	71.0	0.0		--	--
EOS-1	OS	AN38	1E-04	4E+00	3E+00	Metal	Arsenic	C	2 - 29.5	2.08E+01	11/11	5.61E-05	62.8	37.2	0.0		<1	--	--	--		11.1	Yes
							Lead	--	740 - 4130	2.71E+03	11/11	--	--	--	--		--	--	--	--		8.99	Yes
						PAH	Benzo(a)anthracene	C	0.079 - 11	6.74E+00	7/11	5.16E-06	28.0	71.9	0.0		--	--	--	--		--	--
							Benzo(a)pyrene	C	0.064 - 6.5	4.15E+00	8/11	3.18E-05	28.0	71.9	0.0		--	--	--	--		--	--
							Benzo(b)fluoranthene	C	0.13 - 21	8.36E+00	9/11	6.40E-06	28.0	71.9	0.0		--	--	--	--		--	--
							Benzo(k)fluoranthene	C	0.045 - 20	1.47E+01	8/11	1.12E-05	28.0	71.9	0.0		--	--	--	--		--	--
							Chrysene	C	0.081 - 19	1.33E+01	8/11	1.02E-06	28.0	71.9	0.0		--	--	--	--		--	--
							Dibenz(a,h)anthracene	C	0.049 - 1.7	1.70E+00	6/11	7.92E-06	28.0	71.9	0.0		--	--	--	--		--	--
							Indeno(1,2,3-cd)pyrene	C	0.045 - 3.3	3.13E+00	8/11	2.40E-06	28.0	71.9	0.0		--	--	--	--		--	--
						Pest/PCB	Aroclor-1260	C/NC	0.44 - 4.8	4.07E+00	5/5	5.47E-06	26.6	73.4	0.0		1.02E+00	29.0	71.0	0.0		--	--
							PCB-105	C	0.015 - 0.12	1.20E-01	2/6	1.21E-06	26.6	73.4	0.0		--	--	--	--		--	--
							PCB-118	C	0.012 - 0.22	2.20E-01	5/6	2.22E-06	26.6	73.4	0.0		--	--	--	--		--	--
							PCB-187	C	0.024 - 1	1.00E+00	6/6	1.35E-06	26.6	73.4	0.0		<1	--	--	--		--	--
							PCB-206	C	0.004 - 1.2	1.20E+00	5/6	1.62E-06	26.6	73.4	0.0		<1	--	--	--		--	--
EOS-1	OS	AN39	3E-05	<1	<1	Metal	Arsenic	C	8.6 - 9.3	9.30E+00	2/2	2.50E-05	62.8	37.2	0.0		<1	--	--	--		11.1	No
							Lead	--	275 - 875	8.75E+02	2/2	--	--	--	--		--	--	--	--		8.99	Yes

TABLE 5-5: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals		
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?	
EOS-1.	OS	AO39	3E-05	<1	<1	Metal	Arsenic	C	9.3 - 9.3	9.30E+00	1/2	2.50E-05	62.8	37.2	0.0		<1	--	--	--		11.1	No
						Lead	--	12.6 - 232	2.32E+02	2/2	--	--	--	--	--	--	--	--	--	--	--	8.99	Yes
EOS-1	OS	AP38	2E-05	<1	<1	Pest/PCB	Aroclor-1260	C	0.055 - 1.3	1.30E+00	2/2	1.75E-06	26.6	73.4	0.0		<1	--	--	--		--	--
						Metal	Arsenic	C	6 - 6	6.00E+00	1/1	1.62E-05	62.8	37.2	0.0		<1	--	--	--		11.1	No
EOS-1	OS	AQ40	3E-05	<1	<1	Metal	Arsenic	C	7 - 7.2	7.20E+00	2/2	1.94E-05	62.8	37.2	0.0		<1	--	--	--		11.1	No
						Lead	--	92 - 200	2.00E+02	2/2	--	--	--	--	--	--	--	--	--	--	8.99	Yes	
						PAH	Benzo(a)pyrene	C	0.33 - 0.33	3.30E-01	1/1	2.53E-06	28.0	71.9	0.0		--	--	--		--	--	
						Dibenz(a,h)anthracene	C	0.22 - 0.22	2.20E-01	1/1	1.02E-06	28.0	71.9	0.0		--	--	--		--	--		
						Pest/PCB	Aroclor-1260	C	0.25 - 1.7	1.70E+00	2/2	2.29E-06	26.6	73.4	0.0		<1	--	--	--		--	--
						Metal	Arsenic	C	2.8 - 2.8	2.80E+00	1/8	7.54E-06	62.8	37.2	0.0		<1	--	--	--		11.1	No
						Lead	--	17 - 260	2.60E+02	5/8	--	--	--	--	--	--	--	--	--		8.99	Yes	
						PAH	Benzo(a)pyrene	C	0.035 - 0.21	2.10E-01	3/12	1.61E-06	28.0	71.9	0.0		--	--	--		--	--	
EOS-1	OS	AR40	2E-04	1E+01	1E+01	Metal	Arsenic	C	2 - 85.3	3.20E+01	10/11	8.61E-05	62.8	37.2	0.0		<1	--	--	--		11.1	Yes
						Lead	--	7 - 968	9.68E+02	10/11	--	--	--	--	--	--	--	--	--	--	8.99	Yes	
						PAH	Benzo(a)pyrene	C	0.1 - 3.1	3.10E+00	3/10	2.37E-05	28.0	71.9	0.0		--	--	--		--	--	
						Benzo(b)fluoranthene	C	0.042 - 7.7	4.86E+00	5/10	3.72E-06	28.0	71.9	0.0		--	--	--		--	--		
						Benzo(k)fluoranthene	C	0.034 - 2	2.00E+00	3/10	1.53E-06	28.0	71.9	0.0		--	--	--		--	--		
						Dibenz(a,h)anthracene	C	0.069 - 0.57	5.70E-01	2/10	2.65E-06	28.0	71.9	0.0		--	--	--		--	--		
						Indeno(1,2,3-cd)pyrene	C	0.048 - 2.5	2.50E+00	3/10	1.91E-06	28.0	71.9	0.0		--	--	--		--	--		
						Pest/PCB	Aroclor-1260	C/NC	0.038 - 45	4.50E+01	8/11	6.06E-05	26.6	73.4	0.0		1.13E+01	29.0	71.0	0.0		--	--
EOS-1	OS	AS38	2E-04	<1	<1	Metal	Arsenic	C	11 - 56.1	5.18E+01	4/4	1.39E-04	62.8	37.2	0.0		<1	--	--	--		11.1	Yes
						Lead	--	1440 - 1440	1.44E+03	1/4	--	--	--	--	--	--	--	--	--	8.99	Yes		
						PAH	Benzo(a)anthracene	C	0.1 - 1.4	1.40E+00	3/4	1.07E-06	28.0	71.9	0.0		--	--	--		--	--	
						Benzo(a)pyrene	C	0.13 - 2	2.00E+00	4/4	1.53E-05	28.0	71.9	0.0		--	--	--		--	--		
						Benzo(b)fluoranthene	C	0.26 - 3.7	3.70E+00	3/4	2.83E-06	28.0	71.9	0.0		--	--	--		--	--		
						Dibenz(a,h)anthracene	C	0.44 - 0.44	4.40E-01	1/4	2.05E-06	28.0	71.9	0.0		--	--	--		--	--		
EOS-1	OS	AT38	3E-05	<1	<1	Metal	Arsenic	C	8.1 - 10	9.94E+00	6/6	2.68E-05	62.8	37.2	0.0		<1	--	--	--		11.1	No
						Lead	--	26 - 230	1.93E+02	5/6	--	--	--	--	--	--	--	--	--	8.99	Yes		
						PAH	Benzo(a)pyrene	C	0.084 - 0.52	4.66E-01	4/6	3.57E-06	28.0	71.9	0.0		--	--	--		--	--	
						Metal	Arsenic	C	12 - 12	1.20E+01	1/1	3.23E-05	62.8	37.2	0.0		<1	--	--	--		11.1	Yes
EOS-1	OS	AT39	3E-05	<1	<1	Metal	Arsenic	C	6.9 - 9.1	9.10E+00	3/4	2.45E-05	62.8	37.2	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(b)fluoranthene	C	0.2 - 1.4	1.40E+00	2/4	1.07E-06	28.0	71.9	0.0		--	--	--		--	--	
						Pest/PCB	Aroclor-1260	C/NC	0.16 - 6600	6.60E+03	3/4	8.89E-03	26.6	73.4	0.0		1.66E+03	29.0	71.0	0.0		--	--
						Metal	Arsenic	C	3.3 - 24	1.38E+01	9/9	3.72E-05	62.8	37.2	0.0		<1	--	--	--		11.1	Yes
						Lead	--	23 - 487	2.82E+02	8/9	--	--	--	--	--	--	--	--	--		8.99	Yes	
						PAH	Benzo(a)pyrene	C	0.038 - 0.52	5.20E-01	5/9	3.98E-06	28.0	71.9	0.0		--	--	--		--	--	
						Pest/PCB	Aroclor-1260	C/NC	0.24 - 3700	3.70E+03	7/9	4.98E-03	26.6	73.4	0.0		9.33E+02	29.0	71.0	0.0		--	--
						Metal	Arsenic	C	8 - 8	8.00E+00	1/1	2.15E-05	62.8	37.2	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.18 - 0.18	1.80E-01	1/1	1.38E-06	28.0	71.9	0.0		--	--	--		--	--	
EOS-2	OS	AX36	2E-04	2E+00	<1	Metal	Arsenic	C	3 - 95.5	8.17E+01	4/8	2.20E-04	62.8	37.2	0.0		<1	--	--	--		11.1	Yes
						Lead	--	5.5 - 660	6.60E+02	5/8	--	--	--	--	--	--	--	--	--	--	8.99	Yes	
						PAH	Benzo(a)pyrene	C	0.27 - 0.27	2.70E-01	1/8	2.07E-06	28.0	71.9	0.0		--	--	--		--	--	
						Pest/PCB	Aroclor-1254	C	0.89 - 0.89	8.90E-01	1/8	1.20E-06	26.6	73.4	0.0		<1	--	--	--		--	--
							Aroclor-1260	C	0.016 - 0.81	8.10E-01	2/8	1.09E-06	26.6	73.4	0.0		<1	--	--	--		--	--
						Metal	Arsenic	C	4 - 4	4.00E+00	1/1	1.08E-05	62.8	37.2	0.0		<1	--	--	--		11.1	No
EOS-2	OS	AX37	3E-05	<1	<1	PAH	Benzo(a)anthracene	C	1.7 - 1.7	1.70E+00	1/1	1.30E-06	28.0	71.9	0.0		--	--	--		--	--	
						Benzo(a)pyrene	C	2.1 - 2.1	2.10E+00	1/1	1.61E-05	28.0	71.9	0.0		--	--	--		--	--		
						Benzo(b)fluoranthene	C	3 - 3	3.00E+00	1/1	2.30E-06	28.0	71.9	0.0		--	--	--		--	--		
						Benzo(k)fluoranthene	C	1.4 - 1.4	1.40E+00	1/1	1.07E-06	28.0	71.9	0.0		--	--	--		--	--		
EOS-2	OS	AY36	1E-04	<1	<1	Metal	Arsenic	C	2.2 - 50	5.00E+01	6/6	1.35E-04	62.8	37.2	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.67 - 0.67	6.70E-01	1/4	5.13E-06	28.0	71.9	0.0		--	--	--		--	--	
						Pest/PCB	Aroclor-1260	C	0.027 - 1.7	1.70E+00	4/6	2.29E-06	26.6	73.4	0.0		<1	--	--	--		--	--
						Metal	Arsenic	C	3.1 - 19.7	1.97E+01	3/3	5.30E-05	62.8	37.2	0.0		<1	--	--	--		11.1	Yes
EOS-2	OS	AY37	7E-05	4E+00	3E+00	PAH	Benzo(a)pyrene	C	0.39 - 0.39	3.90E-01	1/4	2.99E-06	28.0	71.9	0.0		--	--	--		--	--	
						Pest/PCB	Aroclor-1260	C/NC	0.19 - 12	1.20E+01	2/4	1.62E-05	26.6	73.4	0.0		3.02E+00	29.0	71.0	0.0		--	--

TABLE 5-5: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) BY PLANNED REUSE (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals	
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?
EOS-2	OS	AZ36	3E-04	3E+00	<1	Metal	Arsenic	C	0.72 - 63	6.30E+01	10/10	1.70E-04	62.8	37.2	0.0		<1	--	--	--		11.1	Yes
							Lead	--	1.5 - 453	4.53E+02	10/10	--	--	--	--		--	--	--		8.99	Yes	
						PAH	Benzo(a)anthracene	C	0.087 - 14	1.40E+01	4/5	1.07E-05	28.0	71.9	0.0		--	--	--		--	--	
							Benzo(a)pyrene	C	0.053 - 11	1.10E+01	3/5	8.42E-05	28.0	71.9	0.0		--	--	--		--	--	
							Benzo(b)fluoranthene	C	0.19 - 30	3.00E+01	4/5	2.30E-05	28.0	71.9	0.0		--	--	--		--	--	
							Benzo(k)fluoranthene	C	0.11 - 6.9	6.90E+00	3/5	5.28E-06	28.0	71.9	0.0		--	--	--		--	--	
							Chrysene	C	0.26 - 19	1.90E+01	4/5	1.45E-06	28.0	71.9	0.0		--	--	--		--	--	
							Dibenz(a,h)anthracene	C	2.1 - 2.1	2.10E+00	1/5	9.78E-06	28.0	71.9	0.0		--	--	--		--	--	
							Indeno(1,2,3-cd)pyrene	C	0.04 - 9.8	9.80E+00	3/5	7.50E-06	28.0	71.9	0.0		--	--	--		--	--	
						Pest/PCB	Aroclor-1260	C	0.016 - 3.9	3.90E+00	5/10	5.25E-06	26.6	73.4	0.0		<1	--	--	--		--	--
EOS-2	OS	AZ37	7E-05	<1	<1	Metal	Arsenic	C	16.1 - 18.2	1.82E+01	2/2	4.90E-05	62.8	37.2	0.0		<1	--	--	--		11.1	Yes
							Lead	--	118 - 163	1.63E+02	2/2	--	--	--	--		--	--	--		8.99	Yes	
						PAH	Benzo(a)anthracene	C	0.15 - 1.6	1.60E+00	2/3	1.22E-06	28.0	71.9	0.0		--	--	--		--	--	
							Benzo(a)pyrene	C	0.21 - 1.5	1.50E+00	2/3	1.15E-05	28.0	71.9	0.0		--	--	--		--	--	
							Benzo(b)fluoranthene	C	0.3 - 2	2.00E+00	2/3	1.53E-06	28.0	71.9	0.0		--	--	--		--	--	
						Pest/PCB	Aroclor-1260	C	0.59 - 1.4	1.40E+00	2/3	1.88E-06	26.6	73.4	0.0		<1	--	--	--		--	--
EOS-2	OS	BA36	1E-03	5E+00	3E+00	Metal	Arsenic	C/NC	2.7 - 641	4.30E+02	12/12	1.16E-03	62.8	37.2	0.0		3.20E+00	65.5	34.4	0.1		11.1	Yes
							Lead	--	7.6 - 1080	1.08E+03	12/12	--	--	--	--		--	--	--		8.99	Yes	
						PAH	Benzo(a)anthracene	C	0.84 - 4	4.00E+00	2/7	3.06E-06	28.0	71.9	0.0		--	--	--		--	--	
							Benzo(a)pyrene	C	0.9 - 3.1	3.10E+00	2/7	2.37E-05	28.0	71.9	0.0		--	--	--		--	--	
							Benzo(b)fluoranthene	C	0.098 - 2.9	2.90E+00	4/7	2.22E-06	28.0	71.9	0.0		--	--	--		--	--	
							Benzo(k)fluoranthene	C	0.83 - 3.1	3.10E+00	2/7	2.37E-06	28.0	71.9	0.0		--	--	--		--	--	
						Pest/PCB	Aroclor-1260	C	0.014 - 1.5	1.50E+00	6/12	2.02E-06	26.6	73.4	0.0		<1	--	--	--		--	--
EOS-2	OS	BA37	4E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.36 - 0.36	3.60E-01	1/1	2.76E-06	28.0	71.9	0.0		--	--	--		--	--	
EOS-2	OS	BB36	3E-05	<1	<1	Metal	Arsenic	C	3.8 - 11.2	1.05E+01	5/5	2.84E-05	62.8	37.2	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.061 - 0.39	3.90E-01	2/4	2.99E-06	28.0	71.9	0.0		--	--	--		--	--	
EOS-3	OS	BC36	2E-05	<1	<1	Metal	Arsenic	C	3.2 - 5.7	5.70E+00	2/2	1.53E-05	62.8	37.2	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.073 - 0.46	4.60E-01	2/2	3.52E-06	28.0	71.9	0.0		--	--	--		--	--	
EOS-3	OS	BD35	2E-05	<1	<1	Metal	Arsenic	C	6.8 - 6.8	6.80E+00	1/1	1.83E-05	62.8	37.2	0.0		<1	--	--	--		11.1	No
EOS-3	OS	BE35	3E-05	<1	<1	Metal	Arsenic	C	2.2 - 6.5	4.35E+00	7/10	1.17E-05	62.8	37.2	0.0		<1	--	--	--		11.1	No
							Lead	--	3.8 - 6130	6.13E+03	10/10	--	--	--	--		--	--	--		8.99	Yes	
						PAH	Benzo(a)anthracene	C	0.39 - 1.7	1.70E+00	2/7	1.30E-06	28.0	71.9	0.0		--	--	--		--	--	
							Benzo(a)pyrene	C	0.52 - 1.4	1.40E+00	2/7	1.07E-05	28.0	71.9	0.0		--	--	--		--	--	
							Benzo(b)fluoranthene	C	0.79 - 4.4	4.40E+00	2/7	3.37E-06	28.0	71.9	0.0		--	--	--		--	--	
							Dibenz(a,h)anthracene	C	0.4 - 0.4	4.00E-01	1/6	1.86E-06	28.0	71.9	0.0		--	--	--		--	--	
						Pest/PCB	Aroclor-1260	C	0.094 - 1.1	1.10E+00	3/10	1.48E-06	26.6	73.4	0.0		<1	--	--	--		--	--
EOS-3	OS	BE36	1E-05	<1	<1	Metal	Arsenic	C	2.2 - 2.2	2.20E+00	1/4	5.92E-06	62.8	37.2	0.0		<1	--	--	--		11.1	No
							Lead	--	49.9 - 200	2.00E+02	4/4	--	--	--	--		--	--	--		8.99	Yes	
						PAH	Benzo(a)pyrene	C	0.17 - 0.31	3.10E-01	3/4	2.37E-06	28.0	71.9	0.0		--	--	--		--	--	
EOS-3	OS	BF35	9E-06	<1	<1	Metal	Arsenic	C	0.87 - 2.8	2.80E+00	3/7	7.54E-06	62.8	37.2	0.0		<1	--	--	--		11.1	No
							Lead	--	4.9 - 310	3.10E+02	6/7	--	--	--	--		--	--	--		8.99	Yes	
						PAH	Benzo(a)pyrene	C	0.047 - 0.21	2.10E-01	2/7	1.61E-06	28.0	71.9	0.0		--	--	--		--	--	
EOS-3	OS	BF36	2E-04	<1	<1	Metal	Arsenic	C	4.5 - 4.5	4.50E+00	1/4	1.21E-05	62.8	37.2	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)anthracene	C	0.36 - 18	1.80E+01	3/4	1.38E-05	28.0	71.9	0.0		--	--	--		--	--	
							Benzo(a)pyrene	C	0.25 - 15	1.29E+01	4/4	9.89E-05	28.0	71.9	0.0		--	--	--		--	--	
							Benzo(b)fluoranthene	C	0.33 - 12	1.10E+01	4/4	8.42E-06	28.0	71.9	0.0		--	--	--		--	--	
							Benzo(k)fluoranthene	C	14 - 14	1.40E+01	1/4	1.07E-05	28.0	71.9	0.0		--	--	--		--	--	
							Chrysene	C	0.66 - 19	1.90E+01	4/4	1.45E-06	28.0	71.9	0.0		--	--	--		--	--	
							Dibenz(a,h)anthracene	C	0.53 - 0.78	7.80E-01	2/4	3.63E-06	28.0	71.9	0.0		--	--	--		--	--	
							Indeno(1,2,3-cd)pyrene	C	0.33 - 5.8	5.80E+00	3/4	4.44E-06	28.0	71.9	0.0		--	--	--		--	--	
EOS-3	OS	BG35	2E-05	<1	<1	Metal	Arsenic	C	6.3 - 6.3	6.30E+00	1/1	1.70E-05	62.8	37.2	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.58 - 0.58	5.80E-01	1/1	4.44E-06	28.0	71.9	0.0		--	--	--		--	--	
EOS-3	OS	BG36	5E-05	<1	<1	Metal	Arsenic	C	6.1 - 19.3	1.28E+01	5/7	3.43E-05	62.8	37.2	0.0		<1	--	--	--		11.1	Yes
							Lead	--	25.9 - 460	4.60E+02	5/7	--	--	--	--		--	--	--		8.99	Yes	
						PAH	Benzo(a)pyrene	C	0.1 - 0.2	2.00E-01	5/7	1.53E-06	28.0	71.9	0.0		--	--	--		--	--	
						Pest/PCB	Dieldrin	C	0.14 - 0.14	1.40E-01	1/7	1.19E-06	33.6	66.4	0.0		<1	--	--	--		--	--

TABLE 5-5: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals	
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?
EOS-3	OS	BG36	5E-05	<1	<1	Dioxin	1,2,3,4,6,7,8-HPCDD	C	0.00353 - 0.00353	3.53E-03	1/1	1.51E-06	62.8	37.2	0.0		--	--	--	--	--	--	
							1,2,3,7,8-PECDD	C	0.000606 - 0.00006	6.06E-05	1/1	2.59E-06	62.8	37.2	0.0		--	--	--	--	--	--	
							2,3,4,7,8-PECDF	C	0.000235 - 0.00023	2.35E-04	1/1	5.02E-06	62.8	37.2	0.0		--	--	--	--	--	--	
EOS-3	OS	BH36	2E-05	<1	<1	Metal	Arsenic	C	4.9 - 5.2	5.20E+00	2/5	1.40E-05	62.8	37.2	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.074 - 0.82	8.20E-01	3/5	6.28E-06	28.0	71.9	0.0		--	--	--		--	--	
EOS-3	OS	BI35	7E-06	<1	<1	Metal	Arsenic	C	2.4 - 2.4	2.40E+00	1/2	6.46E-06	62.8	37.2	0.0		<1	--	--	--		11.1	No
							Lead	--	155 - 155	1.55E+02	1/2	--	--	--	--		--	--	--		8.99	Yes	
EOS-3	OS	BI36	2E-04	2E+00	<1	Metal	Arsenic	C	5.1 - 73	7.30E+01	5/8	1.96E-04	62.8	37.2	0.0		<1	--	--	--		11.1	Yes
							Lead	--	36.8 - 370	2.01E+02	6/8	--	--	--	--		--	--	--		8.99	Yes	
						PAH	Benzo(a)pyrene	C	0.038 - 0.69	6.90E-01	4/7	5.28E-06	28.0	71.9	0.0		--	--	--		--	--	
							Benzo(b)fluoranthene	C	0.087 - 1.4	1.40E+00	5/8	1.07E-06	28.0	71.9	0.0		--	--	--		--	--	
EOS-4	OS	AF26	1E-05	<1	<1	Metal	Arsenic	C	5.4 - 5.4	5.40E+00	1/1	1.45E-05	62.8	37.2	0.0		<1	--	--	--		11.1	No
EOS-4	OS	AG27	9E-06	<1	<1	Metal	Arsenic	C	3.2 - 3.2	3.20E+00	1/1	8.61E-06	62.8	37.2	0.0		<1	--	--	--		11.1	No
EOS-5	OS	ZZ01	2E-05	<1	<1	Metal	Arsenic	C	2 - 12.8	7.08E+00	11/13	1.91E-05	62.8	37.2	0.0		<1	--	--	--		11.1	Yes
							Lead	--	6.1 - 1280	1.28E+03	13/13	--	--	--	--		--	--	--		8.99	Yes	
						PAH	Benzo(a)pyrene	C	0.18 - 0.18	1.80E-01	1/13	1.38E-06	28.0	71.9	0.0		--	--	--		--	--	

Notes: All concentrations shown in milligrams per kilogram (mg/kg).

<1	Less than 1
--	Not applicable or chemical is not a COC for this endpoint
%	Percent
bgs	Below ground surface
C	Cancer effect
COC	Chemical of concern
EPC	Exposure point concentration
HHRA	Human health risk assessment
HI	Hazard index
HPAL	Hunters Point ambient level
HPCDD	Heptachlorodibenzo-p-dioxin
IND	Industrial (industrial exposure scenario)
MI	Maritime industrial (industrial exposure scenario)
NC	Noncancer effect
OS	Open space (recreational exposure scenario)
PAH	Polynuclear aromatic hydrocarbon
PECDD	Pentachlorodibenzo-p-dioxin
PECDF	Pentachlorodibenzofuran
Pest/PCB	Pesticide/polychlorinated biphenyl
RD	Research and development
RME	Reasonable maximum exposure
SVOC	Semivolatile organic compound
VOC	Volatile organic compound

TABLE 5-6: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS) BY PLANNED REUSE
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals		
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?	
31A	MU	058073	9E-05	1E+01	7E+00	Metal	Arsenic	C	3.4 - 3.4	3.40E+00	1/4	8.88E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	35000 - 45300	4.40E+04	4/4	--	--	--	--	--	2.00E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	399 - 859	8.59E+02	4/4	--	--	--	--	--	1.02E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	46 - 2220	2.22E+03	4/4	2.28E-07	--	--	--	--	7.35E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	21 - 107	1.07E+02	4/4	--	--	--	--	--	1.65E+00	82.9	0.0	0.0	17.1	117.17	No
						SVOC	Bis(2-ethylhexyl)phthalate	C	2.9 - 2.9	2.90E+00	1/4	2.54E-06	2.5	0.8	0.0	96.7	<1	--	--	--	--	--	--
31A	MU	060074	2E-04	2E+01	7E+00	Metal	Arsenic	C	5.3 - 6.1	6.10E+00	2/2	1.59E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	43200 - 60500	6.05E+04	2/2	--	--	--	--	--	2.75E+00	93.6	0.0	0.0	6.4	58000	Yes
							Manganese	NC	2970 - 5050	5.05E+03	2/2	--	--	--	--	--	5.99E+00	44.9	0.0	2.9	52.2	1431	Yes
							Nickel	NC	200 - 315	3.15E+02	2/2	3.24E-08	--	--	--	--	1.04E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	132 - 209	2.09E+02	2/2	--	--	--	--	--	3.22E+00	82.9	0.0	0.0	17.1	117.17	Yes
31B/36	IND	AP27	8E-06	<1	<1	Metal	Arsenic	C	2.4 - 5.7	3.32E+00	5/13	7.65E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
31B/36	IND	AQ26	1E-05	<1	<1	Metal	Arsenic	C	2.6 - 5.2	5.20E+00	3/10	1.20E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
31B/36	IND	AQ28	7E-06	<1	<1	Metal	Arsenic	C	2.5 - 3.1	3.10E+00	2/4	7.15E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
31B/36	IND	AR27	8E-06	<1	<1	Metal	Arsenic	C	1.8 - 3.5	3.44E+00	5/6	7.94E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
31B/36	IND	AR28	2E-05	<1	<1	Metal	Arsenic	C	0.44 - 32.3	9.89E+00	9/14	2.28E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
31B/36	IND	AS27	2E-05	<1	<1	Metal	Arsenic	C	1.5 - 7.8	7.80E+00	2/2	1.80E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
31B/36	IND	AS28	1E-05	<1	<1	Metal	Arsenic	C	2.2 - 6.5	5.11E+00	4/6	1.18E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
31B/36	IND	AS29	3E-05	<1	<1	Metal	Arsenic	C	0.77 - 15.7	9.29E+00	14/23	2.14E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	1.2 - 1.2	1.20E+00	1/21	6.83E-06	36.8	63.2	0.0		--	--	--	--	--	--	
31B/36	IND	AT26	2E-05	<1	<1	Metal	Arsenic	C	2.5 - 7.3	7.30E+00	3/4	1.68E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
31B/36	IND	AT27	1E-05	<1	<1	Metal	Arsenic	C	2.7 - 6.5	5.41E+00	5/6	1.25E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
31B/36	IND	AT28	7E-06	<1	<1	Metal	Arsenic	C	1.7 - 4.2	2.95E+00	4/8	6.79E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
31B/36	IND	AT29	1E-04	<1	<1	Metal	Arsenic	C	0.83 - 130	4.94E+01	11/14	1.14E-04	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.24 - 0.24	2.40E-01	1/13	1.37E-06	36.8	63.2	0.0		--	--	--	--	--	--	
31B/36	IND	AU28	2E-05	<1	<1	Metal	Arsenic	C	1.3 - 9.2	7.56E+00	6/6	1.74E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
31B/36	IND	AU29	2E-04	<1	<1	Metal	Arsenic	C	4.4 - 105	1.05E+02	13/14	2.42E-04	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
							Lead	--	8.2 - 980	9.80E+02	11/14	--	--	--	--	--	--	--	--	--	8.99	Yes	
						PAH	Benzo(a)pyrene	C	0.065 - 0.8	4.25E-01	5/14	2.42E-06	36.8	63.2	0.0		--	--	--	--	--	--	
31B/36	IND	AU30	9E-06	<1	<1	Metal	Arsenic	C	2.2 - 3.9	3.66E+00	4/4	8.45E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
31B/36	IND	AU31	1E-05	<1	<1	Metal	Arsenic	C	1.5 - 7.2	3.92E+00	6/10	9.03E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
31B/36	IND	AV29	9E-05	<1	<1	Metal	Arsenic	C	2.4 - 50.9	4.01E+01	18/23	9.24E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						VOC	Naphthalene	C	0.039 - 6.6	6.60E+00	2/28	1.42E-06	9.8	0.0	90.2		<1	--	--	--	--	--	
31B/36	IND	AV30	3E-05	<1	<1	Metal	Arsenic	C	4.3 - 11	1.10E+01	4/7	2.54E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.45 - 0.45	4.50E-01	1/7	2.56E-06	36.8	63.2	0.0		--	--	--	--	--	--	
40	IND	AW31	3E-05	<1	<1	Metal	Arsenic	C	1.9 - 12.3	1.17E+01	4/4	2.70E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
40	IND	AX31	1E-05	<1	<1	Metal	Arsenic	C	2.2 - 5.8	5.80E+00	2/2	1.34E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
40	IND	AX33	2E-05	<1	<1	Metal	Arsenic	C	4.5 - 9.4	9.40E+00	3/3	2.17E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
40	IND	AY31	5E-06	<1	<1	Metal	Arsenic	C	2 - 2	2.00E+00	1/3	4.61E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
40	IND	AY33	2E-05	<1	<1	Metal	Arsenic	C	6.8 - 8	8.00E+00	2/8	1.84E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
40	IND	AZ32	2E-05	<1	<1	Metal	Arsenic	C	7.2 - 7.2	7.20E+00	1/3	1.66E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
40	IND	AZ33	1E-05	<1	<1	Metal	Arsenic	C	0.68 - 7.1	4.70E+00	8/8	1.08E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
40	IND	AZ34	1E-05	<1	<1	Metal	Arsenic	C	2.4 - 7.4	5.10E+00	5/8	1.18E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
40	IND	BA33	4E-05	<1	<1	Metal	Arsenic	C	0.7 - 21	1.39E+01	16/18	3.21E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						Pest/PCB	Aroclor-1254	C	3.4 - 3.4	3.40E+00	1/18	3.38E-06	35.1	64.9	0.0		<1	--	--	--	--	--	
							Aroclor-1260	C	2.8 - 2.8	2.80E+00	1/18	2.79E-06	35.1	64.9	0.0		<1	--	--	--	--	--	
41	IND	AX30	2E-05	<1	<1	Metal	Arsenic	C	5.6 - 5.6	5.60E+00	1/1	1.29E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.33 - 0.33	3.30E-01	1/1	1.88E-06	36.8	63.2	0.0		--	--	--	--	--	--	
41	IND	AZ29	1E-05	<1	<1	Metal	Arsenic	C	1.7 - 4.6	4.60E+00	3/3	1.06E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
41	IND	BA29	1E-05	<1	<1	Metal	Arsenic	C	0.64 - 12.9	4.38E+00	35/43	1.01E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
41	IND	BA30	1E-05	<1	<1	Metal	Arsenic	C	0.77 - 11.6	3.47E+00	36/58	8.01E-06	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.023 - 0.23	2.30E-01	3/39	1.31E-06	36.8	63.2	0.0		--	--	--	--	--	--	
41	IND	BA31	1E-05	<1	<1	Metal	Arsenic	C	3.6 - 4.1	4.10E+00	2/3	9.45E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
41	IND	BA32	7E-06	<1	<1	Metal	Arsenic	C	3.1 - 3.1	3.10E+00	1/1	7.15E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
41	IND	BB29	8E-06	<1	<1	Metal	Arsenic	C	0.38 - 7.9	3.29E+00	18/21	7.59E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No

TABLE 5-6: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals	
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?
41	IND	BB30	2E-05	<1	<1	Metal	Arsenic	C	1.1 - 8	3.64E+00	12/17	8.40E-06	71.6	28.4	0.0		<1	--	--	--	11.1	No
						PAH	Benzo(a)pyrene	C	0.014 - 4.8	6.59E-01	7/29	3.75E-06	36.8	63.2	0.0		--	--	--	--	--	--
							Benzo(k)fluoranthene	C	0.021 - 2.3	2.30E+00	3/27	1.31E-06	36.8	63.2	0.0		--	--	--	--	--	--
							Dibenz(a,h)anthracene	C	1 - 1	1.00E+00	1/27	3.46E-06	36.8	63.2	0.0		--	--	--	--	--	--
41	IND	BB31	1E-05	<1	<1	Metal	Arsenic	C	1.7 - 5.6	5.60E+00	3/3	1.29E-05	71.6	28.4	0.0		<1	--	--	--	11.1	No
43	IND	AN30	1E-05	<1	<1	Metal	Arsenic	C	0.33 - 7.2	5.11E+00	7/8	1.18E-05	71.6	28.4	0.0		<1	--	--	--	11.1	No
43	IND	AO29	4E-06	<1	<1	Metal	Arsenic	C	0.75 - 1.7	1.70E+00	2/3	3.92E-06	71.6	28.4	0.0		<1	--	--	--	11.1	No
43	IND	AO30	1E-05	<1	<1	Metal	Arsenic	C	0.57 - 6.3	5.00E+00	14/22	1.15E-05	71.6	28.4	0.0		<1	--	--	--	11.1	No
						Pest/PCB	Aroclor-1260	C	0.3 - 6.8	1.91E+00	7/23	1.90E-06	35.1	64.9	0.0		<1	--	--	--	--	--
43	IND	AO31	2E-05	<1	<1	Metal	Arsenic	C	3 - 7.8	6.55E+00	9/9	1.51E-05	71.6	28.4	0.0		<1	--	--	--	11.1	No
43	IND	AP28	1E-05	<1	<1	Metal	Arsenic	C	4.4 - 5.5	5.50E+00	3/4	1.27E-05	71.6	28.4	0.0		<1	--	--	--	11.1	No
43	IND	AP29	2E-04	<1	<1	Metal	Arsenic	C	0.59 - 244	9.97E+01	12/19	2.30E-04	71.6	28.4	0.0		<1	--	--	--	11.1	Yes
						PAH	Benzo(a)pyrene	C	0.038 - 0.31	2.08E-01	5/19	1.18E-06	36.8	63.2	0.0		--	--	--	--	--	--
43	IND	AP30	1E-05	<1	<1	Metal	Arsenic	C	0.75 - 9.9	5.23E+00	9/10	1.21E-05	71.6	28.4	0.0		<1	--	--	--	11.1	No
43	IND	AP31	2E-05	<1	<1	Metal	Arsenic	C	1.6 - 10.4	6.93E+00	8/9	1.60E-05	71.6	28.4	0.0		<1	--	--	--	11.1	No
						PAH	Benzo(a)pyrene	C	0.2 - 0.2	2.00E-01	1/9	1.14E-06	36.8	63.2	0.0		--	--	--	--	--	--
43	IND	AQ29	1E-05	<1	<1	Metal	Arsenic	C	1.2 - 4.9	4.90E+00	3/3	1.13E-05	71.6	28.4	0.0		<1	--	--	--	11.1	No
43	IND	AQ30	3E-05	<1	<1	Metal	Arsenic	C	0.31 - 12	6.87E+00	9/9	1.58E-05	71.6	28.4	0.0		<1	--	--	--	11.1	Yes
						PAH	Benzo(a)pyrene	C	0.068 - 0.37	2.61E-01	9/26	1.49E-06	36.8	63.2	0.0		--	--	--	--	--	--
						Pest/PCB	Aroclor-1260	C	0.04 - 16	9.56E+00	12/19	9.52E-06	35.1	64.9	0.0		<1	--	--	--	--	--
43	IND	AQ32	1E-05	<1	<1	Metal	Arsenic	C	0.45 - 9.8	6.03E+00	7/7	1.39E-05	71.6	28.4	0.0		<1	--	--	--	11.1	No
43	IND	AR29	8E-06	<1	<1	Metal	Arsenic	C	1.9 - 5.4	3.57E+00	5/7	8.22E-06	71.6	28.4	0.0		<1	--	--	--	11.1	No
43	IND	AR30	2E-05	<1	<1	Metal	Arsenic	C	5.6 - 7.5	7.42E+00	4/4	1.71E-05	71.6	28.4	0.0		<1	--	--	--	11.1	No
43	IND	AR31	2E-05	<1	<1	Metal	Arsenic	C	1.8 - 13	7.07E+00	25/29	1.63E-05	71.6	28.4	0.0		<1	--	--	--	11.1	Yes
						PAH	Benzo(a)pyrene	C	0.039 - 0.2	2.00E-01	3/32	1.14E-06	36.8	63.2	0.0		--	--	--	--	--	--
43	IND	AR32	3E-05	<1	<1	Metal	Arsenic	C	0.39 - 12.6	1.13E+01	43/49	2.61E-05	71.6	28.4	0.0		<1	--	--	--	11.1	Yes
						PAH	Benzo(a)pyrene	C	0.21 - 0.21	2.10E-01	1/57	1.20E-06	36.8	63.2	0.0		--	--	--	--	--	--
43	IND	AR33	1E-05	<1	<1	Metal	Arsenic	C	0.99 - 8.9	5.77E+00	5/6	1.33E-05	71.6	28.4	0.0		<1	--	--	--	11.1	No
43	IND	AS30	3E-05	<1	<1	Metal	Arsenic	C	0.6 - 10.8	1.08E+01	3/6	2.49E-05	71.6	28.4	0.0		<1	--	--	--	11.1	No
						PAH	Benzo(a)pyrene	C	0.23 - 0.23	2.30E-01	1/6	1.31E-06	36.8	63.2	0.0		--	--	--	--	--	--
43	IND	AS31	2E-05	<1	<1	Metal	Arsenic	C	3.7 - 9.9	8.09E+00	7/7	1.87E-05	71.6	28.4	0.0		<1	--	--	--	11.1	No
43	IND	AS32	6E-05	<1	<1	Metal	Arsenic	C	0.81 - 27	2.30E+01	24/34	5.31E-05	71.6	28.4	0.0		<1	--	--	--	11.1	Yes
						PAH	Benzo(a)pyrene	C	0.031 - 0.38	3.49E-01	5/45	1.99E-06	36.8	63.2	0.0		--	--	--	--	--	--
43	IND	AS33	1E-05	<1	<1	Metal	Arsenic	C	1.8 - 15	4.30E+00	12/22	9.91E-06	71.6	28.4	0.0		<1	--	--	--	11.1	Yes
43	IND	AS34	2E-05	<1	<1	Metal	Arsenic	C	3.8 - 10.6	7.46E+00	4/6	1.72E-05	71.6	28.4	0.0		<1	--	--	--	11.1	No
43	IND	AT30	2E-05	<1	<1	Metal	Arsenic	C	0.35 - 9.6	6.59E+00	6/7	1.52E-05	71.6	28.4	0.0		<1	--	--	--	11.1	No
43	IND	AT31	1E-05	<1	<1	Metal	Arsenic	C	1.5 - 6.6	4.82E+00	10/12	1.11E-05	71.6	28.4	0.0		<1	--	--	--	11.1	No
						PAH	Benzo(a)pyrene	C	0.52 - 0.52	5.20E-01	1/26	2.96E-06	36.8	63.2	0.0		--	--	--	--	--	--
43	IND	AT32	3E-04	<1	<1	Metal	Arsenic	C	4.4 - 168	1.48E+02	9/10	3.42E-04	71.6	28.4	0.0		<1	--	--	--	11.1	Yes
						PAH	Benzo(a)pyrene	C	0.027 - 0.76	2.35E-01	4/26	1.34E-06	36.8	63.2	0.0		--	--	--	--	--	--
43	IND	AT33	2E-05	<1	<1	Metal	Arsenic	C	2.9 - 8.7	5.28E+00	6/10	1.22E-05	71.6	28.4	0.0		<1	--	--	--	11.1	No
						PAH	Benzo(a)pyrene	C	0.084 - 2.4	1.27E+00	5/9	7.25E-06	36.8	63.2	0.0		--	--	--	--	--	--
43	IND	AU32	2E-05	<1	<1	Metal	Arsenic	C	0.97 - 12	7.97E+00	12/13	1.84E-05	71.6	28.4	0.0		<1	--	--	--	11.1	Yes
						Pest/PCB	Aroclor-1260	C	0.053 - 2.3	1.87E+00	5/13	1.86E-06	35.1	64.9	0.0		<1	--	--	--	--	--
43	IND	AU33	4E-05	<1	<1	Metal	Arsenic	C	2.6 - 4.1	4.10E+00	4/5	9.45E-06	71.6	28.4	0.0		<1	--	--	--	11.1	No
						PAH	Benzo(a)anthracene	C	0.086 - 6.5	6.50E+00	8/16	3.70E-06	36.8	63.2	0.0		--	--	--	--	--	--
							Benzo(a)pyrene	C	0.061 - 3.5	3.50E+00	8/16	1.99E-05	36.8	63.2	0.0		--	--	--	--	--	--
							Benzo(b)fluoranthene	C	0.0455 - 6.4	6.40E+00	9/16	3.64E-06	36.8	63.2	0.0		--	--	--	--	--	--
							Benzo(k)fluoranthene	C	0.062 - 4.1	4.10E+00	8/16	2.33E-06	36.8	63.2	0.0		--	--	--	--	--	--
43	IND	AU34	3E-05	<1	<1	Metal	Arsenic	C	4.7 - 11.1	1.11E+01	3/10	2.56E-05	71.6	28.4	0.0		<1	--	--	--	11.1	No
						PAH	Benzo(a)pyrene	C	0.3 - 0.3	3.00E-01	1/10	1.71E-06	36.8	63.2	0.0		--	--	--	--	--	--
43	IND	AV32	8E-05	<1	<1	Metal	Arsenic	C	3.3 - 14	7.41E+00	13/16	1.71E-05	71.6	28.4	0.0		<1	--	--	--	11.1	Yes
						PAH	Benzo(a)anthracene	C	0.19 - 4.7	4.70E+00	3/21	2.68E-06	36.8	63.2	0.0		--	--	--	--	--	--
							Benzo(a)pyrene	C	0.19 - 2.1	2.10E+00	3/21	1.20E-05	36.8	63.2	0.0		--	--	--	--	--	--
							Benzo(k)fluoranthene	C	2.3 - 2.3	2.30E+00	1/20	1.31E-06	36.8	63.2	0.0		--	--	--	--	--	--
						VOC	Benzene	C	0.00038 - 19	1.90E+01	7/16	4.89E-05	0.7	0.0	99.3		<1	--	--	--	--	--
							Naphthalene	C	0.048 - 42	6.54E+00	5/25	1.40E-06	9.8	0.0	90.2		<					

TABLE 5-6: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS) BY PLANNED REUSE (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals	
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?
43	IND	AV33	3E-05	<1	<1	Metal Arsenic	C	2.8 - 8	6.05E+00	14/23	1.40E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH Benzo(a)pyrene	C	0.044 - 6.4	6.36E-01	11/54	3.62E-06	36.8	63.2	0.0		--	--	--	--		--	--
						Dibenz(a,h)anthracene	C	1.1 - 1.1	1.10E+00	1/54	3.81E-06	36.8	63.2	0.0		--	--	--	--		--	--
						VOC Benzene	C	0.4 - 0.68	6.80E-01	2/37	1.75E-06	0.7	0.0	99.3		<1	--	--	--		--	--
43	IND	AV34	2E-05	<1	<1	Metal Arsenic	C	1.1 - 11.2	6.89E+00	8/12	1.59E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						PAH Benzo(a)pyrene	C	0.19 - 0.36	3.60E-01	3/12	2.05E-06	36.8	63.2	0.0		--	--	--	--		--	--
43	IND	AW33	4E-05	<1	<1	Metal Arsenic	C	4.8 - 20	1.59E+01	6/6	3.67E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
43	IND	AW34	2E-05	<1	<1	Metal Arsenic	C	1.4 - 11.2	5.33E+00	12/22	1.23E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						PAH Benzo(a)pyrene	C	0.099 - 2.2	8.88E-01	7/30	5.06E-06	36.8	63.2	0.0		--	--	--	--		--	--
43	IND	AX34	9E-06	<1	<1	Metal Arsenic	C	2.2 - 4	4.00E+00	3/3	9.22E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AL32	2E-05	<1	<1	Metal Arsenic	C	2.4 - 9.7	6.67E+00	4/6	1.54E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH Benzo(a)pyrene	C	0.036 - 0.43	4.30E-01	2/6	2.45E-06	36.8	63.2	0.0		--	--	--	--		--	--
						Pest/PCB Aroclor-1260	C	0.36 - 3.6	3.60E+00	2/6	3.58E-06	35.1	64.9	0.0		<1	--	--	--		--	--
44	IND	AM31	9E-06	<1	<1	Metal Arsenic	C	1.4 - 3.9	3.90E+00	2/2	8.99E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AM32	6E-05	3E+00	3E+00	Metal Arsenic	C	1.4 - 8.7	6.77E+00	14/14	1.56E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						Lead	--	1.7 - 6570	5.13E+03	14/14	--	--	--	--		--	--	--	--		8.99	Yes
						PAH Benzo(a)pyrene	C	0.043 - 0.53	3.26E-01	5/14	1.86E-06	36.8	63.2	0.0		--	--	--	--		--	--
						Pest/PCB Aroclor-1254	C/NC	0.57 - 33	2.69E+01	4/14	2.67E-05	35.1	64.9	0.0		1.87E+00	35.1	64.9	0.0		--	--
						Aroclor-1260	C	0.086 - 10	9.48E+00	6/14	9.44E-06	35.1	64.9	0.0		<1	--	--	--		--	--
						VOC Naphthalene	C	0.038 - 5.3	5.30E+00	3/14	1.14E-06	9.8	0.0	90.2		<1	--	--	--		--	--
44	IND	AM33	3E-05	<1	<1	Metal Arsenic	C	2.2 - 14.1	8.03E+00	10/10	1.85E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						PAH Benzo(a)pyrene	C	0.049 - 0.64	6.40E-01	4/10	3.64E-06	36.8	63.2	0.0		--	--	--	--		--	--
						Benzo(b)fluoranthene	C	0.079 - 1.8	1.80E+00	6/10	1.03E-06	36.8	63.2	0.0		--	--	--	--		--	--
						Pest/PCB Aroclor-1260	C	0.1 - 3.9	3.90E+00	7/10	3.88E-06	35.1	64.9	0.0		<1	--	--	--		--	--
44	IND	AM34	3E-05	<1	<1	Metal Arsenic	C	0.64 - 13	6.99E+00	13/16	1.61E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						PAH Benzo(a)pyrene	C	0.092 - 0.75	7.50E-01	2/16	4.27E-06	36.8	63.2	0.0		--	--	--	--		--	--
						Pest/PCB Aroclor-1254	C	1.6 - 1.6	1.60E+00	1/16	1.59E-06	35.1	64.9	0.0		<1	--	--	--		--	--
						Aroclor-1260	C	0.39 - 5.3	5.30E+00	3/16	5.28E-06	35.1	64.9	0.0		<1	--	--	--		--	--
44	IND	AM35	8E-05	7E+00	6E+00	Metal Arsenic	C	3.5 - 32	1.73E+01	6/15	3.99E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						PAH Benzo(a)anthracene	C	0.052 - 2.3	2.30E+00	11/17	1.31E-06	36.8	63.2	0.0		--	--	--	--		--	--
						Benzo(a)pyrene	C	0.051 - 3.6	3.60E+00	11/17	2.05E-05	36.8	63.2	0.0		--	--	--	--		--	--
						Benzo(b)fluoranthene	C	0.1 - 6.4	6.40E+00	11/17	3.64E-06	36.8	63.2	0.0		--	--	--	--		--	--
						Dibenz(a,h)anthracene	C	0.071 - 0.81	8.10E-01	5/17	2.81E-06	36.8	63.2	0.0		--	--	--	--		--	--
						Indeno(1,2,3-cd)pyrene	C	0.1 - 2.3	2.30E+00	9/17	1.31E-06	36.8	63.2	0.0		--	--	--	--		--	--
						Pest/PCB Aroclor-1248	C	7.1 - 7.1	7.10E+00	1/15	7.07E-06	35.1	64.9	0.0		<1	--	--	--		--	--
						VOC 1,2,4-Trimethylbenzene	NC	440 - 440	4.40E+02	1/1	--	--	--	--		2.58E+00	0.2	0.0	99.8		--	--
						1,3,5-Trimethylbenzene	NC	200 - 200	2.00E+02	1/1	--	--	--	--		2.87E+00	0.1	0.0	99.9		--	--
						Naphthalene	C	6.9 - 6.9	6.90E+00	1/18	1.48E-06	9.8	0.0	90.2		<1	--	--	--		--	--
44	IND	AN31	2E-05	<1	<1	Metal Arsenic	C	2.5 - 8.4	8.40E+00	4/4	1.94E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AN32	2E-05	<1	<1	Metal Arsenic	C	2.9 - 6.9	6.90E+00	3/3	1.59E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AN33	2E-05	<1	<1	Metal Arsenic	C	2 - 11.1	7.14E+00	10/11	1.65E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH Benzo(a)pyrene	C	0.06 - 1	5.30E-01	4/11	3.02E-06	36.8	63.2	0.0		--	--	--	--		--	--
						Pest/PCB Aroclor-1260	C	1.6 - 1.6	1.60E+00	1/11	1.59E-06	35.1	64.9	0.0		<1	--	--	--		--	--
44	IND	AO35	9E-06	<1	<1	Metal Arsenic	C	3.3 - 3.7	3.70E+00	2/4	8.53E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AO36	6E-06	<1	<1	Metal Arsenic	C	2.4 - 2.4	2.40E+00	1/1	5.53E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AP32	2E-05	<1	<1	Metal Arsenic	C	3.9 - 11.2	1.06E+01	4/4	2.44E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
44	IND	AP33	1E-05	<1	<1	Metal Arsenic	C	4.7 - 5	5.00E+00	2/3	1.15E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AP34	1E-05	<1	<1	Metal Arsenic	C	2.8 - 6.4	4.46E+00	5/8	1.03E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH Benzo(a)pyrene	C	0.19 - 0.19	1.90E-01	1/7	1.08E-06	36.8	63.2	0.0		--	--	--	--		--	--
44	IND	AP37	2E-05	<1	<1	Metal Arsenic	C	3.8 - 8.9	6.12E+00	6/12	1.41E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						Pest/PCB Aroclor-1254	C	1.3 - 1.3	1.30E+00	1/12	1.29E-06	35.1	64.9	0.0		<1	--	--	--		--	--
						Aroclor-1260	C	0.019 - 4.3	3.31E+00	4/12	3.30E-06	35.1	64.9	0.0		<1	--	--	--		--	--
44	IND	AQ33	8E-06	<1	<1	Metal Arsenic	C	2.5 - 3.6	3.60E+00	2/2	8.30E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AQ35	6E-05	1E+01	1E+01	Metal Arsenic	C	3.5 - 9.1	6.18E+00	5/9	1.43E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH Benzo(a)pyrene	C	0.053 - 0.38	2.81E-01	4/9	1.60E-06	36.8	63.2	0.0		--	--	--	--		--	--
						VOC 1,2,4-Trimethylbenzene	NC	1400 - 1400	1.40E+03	1/1	--	--	--	--		8.21E+00	0.2	0.0	99.8		--	--
						1,3,5-Trimethylbenzene	NC	290 - 290	2.90E+02	1/1	--	--	--	--		4.16E+00	0.1	0.0	99.9		--	--
						Naphthalene	C/NC	0.17 - 210	2.10E+02	2/10	4.51E-05	9.8	0.0	90.2		1.11E+00	0.5	0.0	99.5		--	--

TABLE 5-6: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals	
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		
																						HPAL	Maximum Concentration Exceeds HPAL?
44	IND	AQ36	3E-05	<1	<1	Metal	Arsenic	C	2.6 - 17.6	9.36E+00	11/16	2.16E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						Lead		--	7.6 - 1150	1.15E+03	14/16	--	--	--	--	--	--	--	--	--		8.99	Yes
						PAH	Benzo(a)pyrene	C	0.004 - 0.28	2.80E-01	7/16	1.59E-06	36.8	63.2	0.0		--	--	--	--		--	--
						Pest/PCB	Aldrin	C	0.21 - 0.21	2.10E-01	1/16	1.45E-06	43.1	56.9	0.0		<1	--	--	--		--	--
44	IND	AR34	2E-05	<1	<1	Metal	Arsenic	C	0.42 - 6.1	6.10E+00	3/4	1.41E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AR35	1E-05	<1	<1	PAH	Benzo(a)anthracene	C	0.24 - 1.9	1.90E+00	2/2	1.08E-06	36.8	63.2	0.0		--	--	--	--		--	--
							Benzo(a)pyrene	C	0.23 - 1.2	1.20E+00	2/2	6.83E-06	36.8	63.2	0.0		--	--	--	--		--	--
							Benzo(b)fluoranthene	C	0.47 - 2.6	2.60E+00	2/2	1.48E-06	36.8	63.2	0.0		--	--	--	--		--	--
44	IND	AR36	4E-05	<1	<1	Metal	Arsenic	C	2 - 42.9	1.41E+01	7/11	3.25E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.22 - 0.22	2.20E-01	1/8	1.25E-06	36.8	63.2	0.0		--	--	--	--		--	--
						VOC	Naphthalene	C	12 - 15	1.50E+01	2/10	3.22E-06	9.8	0.0	90.2		<1	--	--	--		--	--
44	IND	AR37	1E-05	<1	<1	Metal	Arsenic	C	2.7 - 3.5	3.46E+00	4/4	7.99E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AS36	9E-06	<1	<1	Metal	Arsenic	C	3.1 - 3.5	3.50E+00	3/3	8.07E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AU35	8E-06	<1	<1	Metal	Arsenic	C	1.4 - 3.5	3.50E+00	3/4	8.07E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AU36	5E-06	<1	<1	Metal	Arsenic	C	2.2 - 2.2	2.20E+00	1/1	5.07E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AV36	3E-05	<1	<1	Metal	Arsenic	C	2.8 - 15	1.22E+01	13/13	2.82E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
44	IND	AW35	2E-05	<1	<1	Metal	Arsenic	C	4.3 - 7.5	7.50E+00	2/4	1.73E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AW36	2E-05	<1	<1	Metal	Arsenic	C	2.1 - 13	7.14E+00	12/12	1.65E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.059 - 1.3	4.38E-01	6/12	2.49E-06	36.8	63.2	0.0		--	--	--	--		--	--
44	IND	AX35	1E-05	<1	<1	Metal	Arsenic	C	1.9 - 4.5	4.50E+00	4/4	1.04E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
44	IND	AY35	3E-05	<1	<1	Metal	Arsenic	C	4.3 - 11.9	1.19E+01	3/3	2.74E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
45	RD	032075	3E-07	1E+01	6E+00	Metal	Iron	NC	44000 - 56900	5.69E+04	2/2	--	--	--	--	--	2.59E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	1100 - 1160	1.16E+03	2/2	--	--	--	--	--	1.38E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	1420 - 1670	1.67E+03	2/2	1.72E-07	--	--	--	--	5.53E+00	19.3	0.0	1.0	79.6	*	No
45	RD	033077	8E-05	1E+01	7E+00	Metal	Arsenic	C	3.2 - 3.2	3.20E+00	1/2	8.36E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	25500 - 36900	3.69E+04	2/2	--	--	--	--	--	1.68E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	700 - 6040	6.04E+03	2/2	--	--	--	--	--	7.16E+00	44.9	0.0	2.9	52.2	1431	Yes
							Nickel	NC	88.7 - 1020	1.02E+03	2/2	1.05E-07	--	--	--	--	3.38E+00	19.3	0.0	1.0	79.6	*	No
45	RD	034074	3E-07	1E+01	7E+00	Metal	Iron	NC	45500 - 50700	5.07E+04	2/2	--	--	--	--	--	2.31E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	821 - 897	8.97E+02	2/2	--	--	--	--	--	1.06E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	1440 - 2030	2.03E+03	2/2	2.09E-07	--	--	--	--	6.72E+00	19.3	0.0	1.0	79.6	*	No
							Thallium	NC	6.8 - 6.8	6.80E+00	1/2	--	--	--	--	--	1.35E+00	97.3	0.0	0.0	2.7	0.81	Yes
45	RD	035079	4E-04	9E+00	4E+00	Metal	Arsenic	C/NC	0.72 - 16.5	1.65E+01	2/3	4.31E-04	56.6	5.4	0.0	38.0	1.05E+00	66.8	5.6	0.1	27.5	11.1	Yes
							Iron	NC	23500 - 34900	3.49E+04	3/3	--	--	--	--	--	1.59E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	31 - 1200	1.20E+03	3/3	1.23E-07	--	--	--	--	3.97E+00	19.3	0.0	1.0	79.6	*	No
45	RD	036074	3E-07	1E+01	5E+00	Metal	Iron	NC	56500 - 64100	6.41E+04	2/2	--	--	--	--	--	2.92E+00	93.6	0.0	0.0	6.4	58000	Yes
							Manganese	NC	1560 - 1580	1.58E+03	2/2	--	--	--	--	--	1.87E+00	44.9	0.0	2.9	52.2	1431	Yes
							Nickel	NC	397 - 1440	1.44E+03	2/2	1.48E-07	--	--	--	--	4.77E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	42.9 - 191	1.91E+02	2/2	--	--	--	--	--	2.95E+00	82.9	0.0	0.0	17.1	117.17	Yes
45	RD	037074	4E-05	6E+00	2E+00	Metal	Arsenic	C	1.6 - 1.6	1.60E+00	1/1	4.18E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	38400 - 38400	3.84E+04	1/1	--	--	--	--	--	1.75E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	459 - 459	4.59E+02	1/1	4.72E-08	--	--	--	--	1.52E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	71.8 - 71.8	7.18E+01	1/1	--	--	--	--	--	1.11E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	037076	5E-05	1E+01	4E+00	Metal	Arsenic	C	2 - 2	2.00E+00	1/2	5.22E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	29000 - 37700	3.77E+04	2/2	--	--	--	--	--	1.72E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	878 - 2840	2.84E+03	2/2	--	--	--	--	--	3.37E+00	44.9	0.0	2.9	52.2	1431	Yes
							Nickel	NC	45.5 - 1170	1.17E+03	2/2	1.20E-07	--	--	--	--	3.87E+00	19.3	0.0	1.0	79.6	*	No
45	RD	038074	3E-05	1E+01	7E+00	Metal	Arsenic	C	1.1 - 1.1	1.10E+00	1/5	2.87E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	32200 - 59200	5.47E+04	5/5	--	--	--	--	--	2.49E+00	93.6	0.0	0.0	6.4	58000	Yes
							Manganese	NC	565 - 1080	9.96E+02	5/5	--	--	--	--	--	1.18E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	832 - 2210	2.16E+03	5/5	2.22E-07	--	--	--	--	7.14E+00	19.3	0.0	1.0	79.6	*	No
							Thallium	NC	5.7 - 5.7	5.70E+00	1/5	--	--	--	--	--	1.13E+00	97.3	0.0	0.0	2.7	0.81	Yes
							Vanadium	NC	7.4 - 76.4	6.94E+01	5/5	--	--	--	--	--	1.07E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	038077	1E-04	1E+01	4E+00	Metal	Arsenic	C	5.2 - 5.2	5.20E+00	1/3	1.36E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	32100 - 34800	3.48E+04	3/3	--	--	--	--	--	1.58E+00	93.6	0.0	0.0	6.4	58000	No
							Lead	--	2.8 - 161	1.61E+02	3/3	--	--	--	--	--	--	--	--	--	--	8.99	Yes
							Nickel	NC	244 - 1250	1.25E+03	3/3	1.29E-07	--	--	--	--	4.14E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	24.5 - 85.7	8.57E+01	3/3	--	--	--	--	--	1.32E+00	82.9	0.0	0.0	17.1	117.17	No

TABLE 5-6: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals		
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?	
45	RD	038079	6E-04	4E+01	2E+01	Metal	Antimony	NC	38.4 - 38.4	3.84E+01	1/3	--	--	--	--	--	3.76E+00	32.7	0.0	0.0	67.3	9.05	Yes
							Arsenic	C/NC	10.7 - 21.8	2.18E+01	2/3	5.69E-04	56.6	5.4	0.0	38.0	1.39E+00	66.8	5.6	0.1	27.5	11.1	Yes
							Cadmium	NC	8.2 - 8.2	8.20E+00	1/3	1.39E-08	--	--	--	--	2.37E+00	8.8	0.0	0.0	91.1	3.14	Yes
							Copper	NC	15.4 - 165	1.65E+02	3/3	--	--	--	--	1.04E+00	5.5	0.0	0.0	94.5	124.31	Yes	
							Iron	NC	34000 - 43100	4.31E+04	3/3	--	--	--	--	1.96E+00	93.6	0.0	0.0	6.4	58000	No	
							Lead	--	1.9 - 504	5.04E+02	3/3	--	--	--	--	--	--	--	--	--	8.99	Yes	
							Nickel	NC	461 - 2800	2.80E+03	3/3	2.88E-07	--	--	--	--	9.27E+00	19.3	0.0	1.0	79.6	*	No
							Zinc	NC	40.4 - 5400	5.40E+03	3/3	--	--	--	--	1.45E+01	1.6	0.0	0.0	98.4	109.86	Yes	
						PAH	Benzo(a)anthracene	C	0.55 - 0.55	5.50E-01	1/3	1.49E-06	69.5	28.5	0.0	2.0	--	--	--	--	--	--	--
							Benzo(a)pyrene	C	0.76 - 0.76	7.60E-01	1/3	2.04E-05	70.1	28.8	0.0	1.1	--	--	--	--	--	--	--
							Benzo(b)fluoranthene	C	1.2 - 1.2	1.20E+00	1/3	3.55E-06	63.6	26.1	0.0	10.3	--	--	--	--	--	--	--
						Pest/PCB	Aroclor-1260	C	0.58 - 0.58	5.80E-01	1/3	2.75E-06	66.1	29.2	0.0	4.7	<1	--	--	--	--	--	--
							SVOC	Bis(2-ethylhexyl)phthalate	C	5.4 - 5.4	5.40E+00	1/3	4.73E-06	2.5	0.8	0.0	96.7	<1	--	--	--	--	--
45	RD	039075	9E-05	1E+01	4E+00	Metal	Arsenic	C	1 - 3.6	3.60E+00	2/2	9.40E-05	56.6	5.4	0.0	38.0	<1	--	--	--	11.1	No	
							Iron	NC	30600 - 40700	4.07E+04	2/2	--	--	--	--	1.85E+00	93.6	0.0	0.0	6.4	58000	No	
							Manganese	NC	830 - 2600	2.60E+03	2/2	--	--	--	--	3.08E+00	44.9	0.0	2.9	52.2	1431	Yes	
							Nickel	NC	782 - 1140	1.14E+03	2/2	1.17E-07	--	--	--	--	3.77E+00	19.3	0.0	1.0	79.6	*	No
45	RD	039076	4E-07	1E+01	5E+00	Metal	Iron	NC	34000 - 37800	3.78E+04	2/2	--	--	--	--	1.72E+00	93.6	0.0	0.0	6.4	58000	No	
							Nickel	NC	484 - 1490	1.49E+03	2/2	1.53E-07	--	--	--	--	4.93E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	19.8 - 65.9	6.59E+01	2/2	--	--	--	--	1.02E+00	82.9	0.0	0.0	17.1	117.17	No	
							Nickel	NC	782 - 1140	1.14E+03	2/2	1.17E-07	--	--	--	--	3.77E+00	19.3	0.0	1.0	79.6	*	No
45	RD	040073	2E-04	1E+01	6E+00	Metal	Arsenic	C	6.4 - 6.4	6.40E+00	1/2	1.67E-04	56.6	5.4	0.0	38.0	<1	--	--	--	11.1	No	
							Iron	NC	49700 - 56600	5.66E+04	2/2	--	--	--	--	2.58E+00	93.6	0.0	0.0	6.4	58000	No	
							Manganese	NC	837 - 1580	1.58E+03	2/2	--	--	--	--	1.87E+00	44.9	0.0	2.9	52.2	1431	Yes	
							Nickel	NC	1600 - 1930	1.93E+03	2/2	1.98E-07	--	--	--	--	6.39E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	51.2 - 81.3	8.13E+01	2/2	--	--	--	--	1.25E+00	82.9	0.0	0.0	17.1	117.17	No	
45	RD	040074	4E-05	1E+01	7E+00	Metal	Arsenic	C	1.4 - 1.4	1.40E+00	1/3	3.66E-05	56.6	5.4	0.0	38.0	<1	--	--	--	11.1	No	
							Iron	NC	36300 - 45900	4.59E+04	3/3	--	--	--	--	2.09E+00	93.6	0.0	0.0	6.4	58000	No	
							Nickel	NC	129 - 2240	2.24E+03	3/3	2.30E-07	--	--	--	--	7.41E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	8.9 - 91.9	9.19E+01	3/3	--	--	--	--	1.42E+00	82.9	0.0	0.0	17.1	117.17	No	
45	RD	040075	1E-04	1E+01	5E+00	Metal	Arsenic	C	0.91 - 4.7	4.70E+00	2/2	1.23E-04	56.6	5.4	0.0	38.0	<1	--	--	--	11.1	No	
							Manganese	NC	386 - 4390	4.39E+03	2/2	--	--	--	--	5.21E+00	44.9	0.0	2.9	52.2	1431	Yes	
							Nickel	NC	33 - 854	8.54E+02	2/2	8.78E-08	--	--	--	--	2.83E+00	19.3	0.0	1.0	79.6	*	No
45	RD	040077	2E-07	7E+00	3E+00	Metal	Iron	NC	26000 - 26000	2.60E+04	1/1	--	--	--	--	1.18E+00	93.6	0.0	0.0	6.4	58000	No	
							Nickel	NC	1020 - 1020	1.02E+03	1/1	1.05E-07	--	--	--	--	3.38E+00	19.3	0.0	1.0	79.6	*	No
45	RD	040079	6E-05	8E+00	3E+00	Metal	Arsenic	C	2.4 - 2.4	2.40E+00	1/1	6.27E-05	56.6	5.4	0.0	38.0	<1	--	--	--	11.1	No	
							Iron	NC	36100 - 36100	3.61E+04	1/1	--	--	--	--	1.64E+00	93.6	0.0	0.0	6.4	58000	No	
							Nickel	NC	1030 - 1030	1.03E+03	1/1	1.06E-07	--	--	--	--	3.41E+00	19.3	0.0	1.0	79.6	*	No
45	RD	040082	2E-04	6E+00	2E+00	Metal	Arsenic	C	2.1 - 8	8.00E+00	3/3	2.09E-04	56.6	5.4	0.0	38.0	<1	--	--	--	11.1	No	
							Manganese	NC	181 - 905	9.05E+02	3/3	--	--	--	--	1.07E+00	44.9	0.0	2.9	52.2	1431	No	
							Nickel	NC	53 - 485	4.85E+02	3/3	4.99E-08	--	--	--	--	1.61E+00	19.3	0.0	1.0	79.6	*	No
						PAH	Benzo(a)anthracene	C	1 - 1	1.00E+00	1/3	2.70E-06	69.5	28.5	0.0	2.0	--	--	--	--	--	--	--
							Benzo(a)pyrene	C	0.67 - 0.67	6.70E-01	1/3	1.80E-05	70.1	28.8	0.0	1.1	--	--	--	--	--	--	--
							Benzo(b)fluoranthene	C	1 - 1	1.00E+00	1/3	2.96E-06	63.6	26.1	0.0	10.3	--	--	--	--	--	--	--
							Benzo(k)fluoranthene	C	0.4 - 0.4	4.00E-01	1/3	1.18E-06	63.6	26.1	0.0	10.3	--	--	--	--	--	--	--
45	RD	041075	1E-04	1E+01	3E+00	Metal	Arsenic	C	2.6 - 5.6	5.60E+00	2/2	1.46E-04	56.6	5.4	0.0	38.0	<1	--	--	--	11.1	No	
							Iron	NC	27400 - 42500	4.25E+04	2/2	--	--	--	--	1.94E+00	93.6	0.0	0.0	6.4	58000	No	
							Manganese	NC	936 - 2550	2.55E+03	2/2	--	--	--	--	3.02E+00	44.9	0.0	2.9	52.2	1431	Yes	
							Nickel	NC	172 - 1050	1.05E+03	2/2	1.08E-07	--	--	--	--	3.48E+00	19.3	0.0	1.0	79.6	*	No
45	RD	041079	8E-05	1E+01	4E+00	Metal	Arsenic	C	3 - 3	3.00E+00	1/1	7.84E-05	56.6	5.4	0.0	38.0	<1	--	--	--	11.1	No	
							Iron	NC	48400 - 48400	4.84E+04	1/1	--	--	--	--	2.20E+00	93.6	0.0	0.0	6.4	58000	No	
							Manganese	NC	2950 - 2950	2.95E+03	1/1	--	--	--	--	3.50E+00	44.9	0.0	2.9	52.2	1431	Yes	
							Vanadium	NC	134 - 134	1.34E+02	1/1	--	--	--	--	2.07E+00	82.9	0.0	0.0	17.1	117.17	Yes	
45	RD	041082	3E-04	2E+01	6E+00	Metal	Arsenic	C	0.81 - 11.8	9.23E+00	6/6	2.41E-04	56.6	5.4	0.0	38.0	<1	--	--	--	11.1	Yes	
							Cadmium	NC	3 - 6.8	6.80E+00	2/6	1.15E-08	--	--	--	--	1.97E+00	8.8	0.0	0.0	91.1	3.14	Yes
							Iron	NC	28900 - 75700	5.95E+04	6/6	--	--	--	--	2.71E+00	93.6	0.0	0.0	6.4	58000	Yes	
							Manganese	NC	642 - 2070	1.54E+03	6/6	--	--	--	--	1.82E+00	44.9	0.0	2.9	52.2	1431	Yes	
							Mercury	NC	0.26 - 5.6	5.60E+00	5/6	--	--	--	--	3.52E+00	6.8	0.0	0.0	93.2	2.28	Yes	
							Nickel	NC	91.7 - 1130	1.13E+03	6/6	1.16E-07	--	--	--	--	3.74E+00	19.3	0.0	1.0	79.6	*	No
							Silver	NC	5 - 59.9	5.99E+01	2/6	--	--	--	--	1.21E+00	12.7	0.0	0.0	87.3	1.43	Yes	
							Vanadium	NC	55.4 - 88.6	7.81E+01	6/6	--	--	--	--	1.20E+00	82.9	0.0	0.0	17.1	117.17	No	
							Zinc	NC	98.7 - 650	6.38E+02	6/6	--	--	--	--	1.71E+00	1.6	0.0	0.0	98.4	109.86	Yes	

TABLE 5-6: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals			
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?		
						PAH	Benzo(a)anthracene	C	0.59 - 0.59	5.90E-01	1/6	1.60E-06	69.5	28.5	0.0	2.0	--	--	--	--	--	--		
							Benzo(a)pyrene	C	0.94 - 0.94	9.40E-01	1/6	2.52E-05	70.1	28.8	0.0	1.1	--	--	--	--	--	--	--	--
							Benzo(b)fluoranthene	C	0.2 - 1.2	1.20E+00	2/6	3.55E-06	63.6	26.1	0.0	10.3	--	--	--	--	--	--	--	--
							Benzo(k)fluoranthene	C	0.47 - 0.47	4.70E-01	1/6	1.39E-06	63.6	26.1	0.0	10.3	--	--	--	--	--	--	--	--
							Indeno(1,2,3-cd)pyrene	C	0.6 - 0.6	6.00E-01	1/6	1.73E-06	65.3	26.8	0.0	8.0	--	--	--	--	--	--	--	--
45	RD	042073	3E-04	2E+01	5E+00	Pest/PCB	Dieldrin	C	0.005 - 0.005	5.00E-03	1/6	7.58E-06	1.7	0.5	0.0	97.8	<1	--	--	--	--	--	--	
							Metal	Arsenic	C	3.2 - 11.6	1.07E+01	4/4	2.80E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	Yes
								Iron	NC	23400 - 61200	6.03E+04	4/4	--	--	--	--	2.74E+00	93.6	0.0	0.0	6.4	58000	Yes	
								Manganese	NC	843 - 3200	3.20E+03	4/4	--	--	--	--	3.80E+00	44.9	0.0	2.9	52.2	1431	Yes	
								Nickel	NC	106 - 1540	1.43E+03	4/4	1.47E-07	--	--	--	4.75E+00	19.3	0.0	1.0	79.6	*	No	
Thallium	NC	7.1 - 7.1	7.10E+00	1/4	--	--		--	--	1.41E+00	97.3	0.0	0.0	2.7	0.81	Yes								
Vanadium	NC	62 - 134	1.26E+02	4/4	--	--	--	--	1.95E+00	82.9	0.0	0.0	17.1	117.17	Yes									
45	RD	042074	5E-05	1E+01	4E+00	Metal	Arsenic	C	1.9 - 1.9	1.90E+00	1/1	4.96E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No	
							Iron	NC	53300 - 53300	5.33E+04	1/1	--	--	--	--	2.43E+00	93.6	0.0	0.0	6.4	58000	No		
							Manganese	NC	1520 - 1520	1.52E+03	1/1	--	--	--	--	1.80E+00	44.9	0.0	2.9	52.2	1431	Yes		
							Vanadium	NC	202 - 202	2.02E+02	1/1	--	--	--	--	3.12E+00	82.9	0.0	0.0	17.1	117.17	Yes		
							Arsenic	C	4.8 - 16.3	1.06E+01	4/6	2.77E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	Yes	
45	RD	042081	3E-04	1E+01	4E+00	Metal	Iron	NC	29500 - 37500	3.64E+04	6/6	--	--	--	--	1.66E+00	93.6	0.0	0.0	6.4	58000	No		
							Manganese	NC	584 - 2350	1.74E+03	6/6	--	--	--	--	2.06E+00	44.9	0.0	2.9	52.2	1431	Yes		
							Nickel	NC	28.9 - 1370	1.09E+03	6/6	1.12E-07	--	--	--	3.60E+00	19.3	0.0	1.0	79.6	*	No		
							Vanadium	NC	22 - 73	6.80E+01	6/6	--	--	--	--	1.05E+00	82.9	0.0	0.0	17.1	117.17	No		
							Benzo(a)pyrene	C	0.2 - 0.2	2.00E-01	1/6	5.36E-06	70.1	28.8	0.0	1.1	--	--	--	--	--	--	--	--
45	RD	042082	2E-04	2E+01	5E+00	Metal	Benzo(b)fluoranthene	C	0.34 - 0.34	3.40E-01	1/6	1.00E-06	63.6	26.1	0.0	10.3	--	--	--	--	--	--		
							Antimony	NC	11.9 - 11.9	1.19E+01	1/1	--	--	--	--	1.16E+00	32.7	0.0	0.0	67.3	9.05	Yes		
							Arsenic	C	7.5 - 7.5	7.50E+00	1/1	1.96E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No	
							Copper	NC	771 - 771	7.71E+02	1/1	--	--	--	--	4.84E+00	5.5	0.0	0.0	94.5	124.31	Yes		
							Iron	NC	46000 - 46000	4.60E+04	1/1	--	--	--	--	2.09E+00	93.6	0.0	0.0	6.4	58000	No		
45	RD	043075	3E-07	1E+01	5E+00	Metal	Lead	--	321 - 321	3.21E+02	1/1	--	--	--	--	--	--	--	--	--	8.99	Yes		
							Manganese	NC	1130 - 1130	1.13E+03	1/1	--	--	--	--	1.34E+00	44.9	0.0	2.9	52.2	1431	No		
							Vanadium	NC	85.9 - 85.9	8.59E+01	1/1	--	--	--	--	1.32E+00	82.9	0.0	0.0	17.1	117.17	No		
							Zinc	NC	794 - 794	7.94E+02	1/1	--	--	--	--	2.13E+00	1.6	0.0	0.0	98.4	109.86	Yes		
							Benzo(a)anthracene	C	1.3 - 1.3	1.30E+00	1/1	3.51E-06	69.5	28.5	0.0	2.0	--	--	--	--	--	--	--	--
45	RD	043081	5E-04	2E+01	5E+00	Metal	Benzo(a)pyrene	C	0.79 - 0.79	7.90E-01	1/1	2.12E-05	70.1	28.8	0.0	1.1	--	--	--	--	--	--		
							Benzo(b)fluoranthene	C	2.5 - 2.5	2.50E+00	1/1	7.39E-06	63.6	26.1	0.0	10.3	--	--	--	--	--	--	--	--
							Benzo(k)fluoranthene	C	0.75 - 0.75	7.50E-01	1/1	2.22E-06	63.6	26.1	0.0	10.3	--	--	--	--	--	--	--	--
							Dibenz(a,h)anthracene	C	0.14 - 0.14	1.40E-01	1/1	2.42E-06	66.2	27.2	0.0	6.7	--	--	--	--	--	--	--	--
							Indeno(1,2,3-cd)pyrene	C	0.45 - 0.45	4.50E-01	1/1	1.30E-06	65.3	26.8	0.0	8.0	--	--	--	--	--	--	--	--
45	RD	043082	2E-06	1E+01	5E+00	Metal	Indeno(1,2,3-cd)pyrene	C	0.45 - 0.45	4.50E-01	1/1	1.30E-06	65.3	26.8	0.0	8.0	--	--	--	--	--	--		
							Aroclor-1260	C	0.82 - 0.82	8.20E-01	1/1	3.89E-06	66.1	29.2	0.0	4.7	<1	--	--	--	--	--	--	--
							Iron	NC	43100 - 43100	4.31E+04	1/1	--	--	--	--	1.96E+00	93.6	0.0	0.0	6.4	58000	No		
							Nickel	NC	1540 - 1540	1.54E+03	1/1	1.58E-07	--	--	--	--	5.10E+00	19.3	0.0	1.0	79.6	*	No	
							Arsenic	C/NC	4.6 - 17.9	1.79E+01	2/5	4.68E-04	56.6	5.4	0.0	38.0	1.14E+00	66.8	5.6	0.1	27.5	11.1	Yes	
45	RD	043082	2E-06	1E+01	5E+00	Metal	Iron	NC	36900 - 49900	4.88E+04	5/5	--	--	--	--	2.22E+00	93.6	0.0	0.0	6.4	58000	No		
							Manganese	NC	824 - 3360	2.55E+03	5/5	--	--	--	--	3.02E+00	44.9	0.0	2.9	52.2	1431	Yes		
							Nickel	NC	33.9 - 2050	1.51E+03	5/5	1.56E-07	--	--	--	--	5.01E+00	19.3	0.0	1.0	79.6	*	No	
							Vanadium	NC	52.7 - 100	9.33E+01	5/5	--	--	--	--	1.44E+00	82.9	0.0	0.0	17.1	117.17	No		
							Benzo(a)pyrene	C	0.073 - 0.073	7.30E-02	1/5	1.96E-06	70.1	28.8	0.0	1.1	--	--	--	--	--	--	--	--
45	RD	044073	2E-04	1E+01	5E+00	Metal	Antimony	NC	7.3 - 43.5	4.35E+01	2/3	--	--	--	--	4.26E+00	32.7	0.0	0.0	67.3	9.05	Yes		
							Iron	NC	27700 - 38300	3.83E+04	3/3	--	--	--	--	1.74E+00	93.6	0.0	0.0	6.4	58000	No		
							Nickel	NC	909 - 1590	1.59E+03	3/3	1.64E-07	--	--	--	--	5.26E+00	19.3	0.0	1.0	79.6	*	No	
							Aroclor-1254	C	0.18 - 0.18	1.80E-01	1/3	1.94E-06	29.1	12.9	0.0	58.0	<1	--	--	--	--	--	--	--
							Arsenic	C	7.4 - 7.4	7.40E+00	1/2	1.93E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	--	11.1	No
45	RD	044079	4E-04	1E+01	5E+00	Metal	Iron	NC	33800 - 51000	5.10E+04	2/2	--	--	--	--	2.32E+00	93.6	0.0	0.0	6.4	58000	No		
							Manganese	NC	636 - 1170	1.17E+03	2/2	--	--	--	--	1.39E+00	44.9	0.0	2.9	52.2	1431	No		
							Nickel	NC	359 - 1470	1.47E+03	2/2	1.51E-07	--	--	--	--	4.87E+00	19.3	0.0	1.0	79.6	*	No	
							Thallium	NC	5.6 - 5.8	5.80E+00	2/2	--	--	--	--	1.15E+00	97.3	0.0	0.0	2.7	0.81	Yes		
							Vanadium	NC	79.2 - 87.7	8.77E+01	2/2	--	--	--	--	1.35E+00	82.9	0.0	0.0	17.1	117.17	No		
45	RD	044079	4E-04	1E+01	5E+00	Metal	Arsenic	C	14.3 - 14.3	1.43E+01	1/3	3.74E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	Yes	
							Iron	NC	35500 - 43100	4.31E+04	3/3	--	--	--	--	1.96E+00	93.6	0.0	0.0	6.4	58000	No		
							Manganese	NC	600 - 2440	2.44E+03	3/3	--	--	--	--	2.89E+00	44.9	0.0	2.9	52.2	1431	Yes		
							Nickel	NC	25.3 - 1590	1.59E+03	3/3	1.64E-07	--	--	--	--	5.26E+00	19.3	0.0	1.0	79.6	*	No	

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Revised Parcel E RI Report

TABLE 5-6: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals	
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?
45	RD	046077	2E-04	1E+01	6E+00	Metal	Arsenic	C	3.5 - 7.7	7.70E+00	2/7	2.01E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	23600 - 44800	4.02E+04	7/7	--	--	--	--	1.83E+00	93.6	0.0	0.0	6.4	58000	No	
							Manganese	NC	487 - 935	9.02E+02	7/7	--	--	--	--	1.07E+00	44.9	0.0	2.9	52.2	1431	No	
							Nickel	NC	668 - 2420	1.76E+03	7/7	1.81E-07	--	--	--	5.84E+00	19.3	0.0	1.0	79.6	*	No	
45	RD	046079	2E-04	8E+00	2E+00	Metal	Arsenic	C	2.9 - 7	7.00E+00	2/2	1.83E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	32300 - 44000	4.40E+04	2/2	--	--	--	--	2.00E+00	93.6	0.0	0.0	6.4	58000	No	
							Manganese	NC	473 - 864	8.64E+02	2/2	--	--	--	--	1.02E+00	44.9	0.0	2.9	52.2	1431	No	
							Nickel	NC	96.3 - 668	6.68E+02	2/2	6.87E-08	--	--	--	2.21E+00	19.3	0.0	1.0	79.6	*	No	
45	RD	046080	3E-07	1E+01	5E+00	Metal	Vanadium	NC	39 - 88.3	8.83E+01	2/2	--	--	--	--	1.36E+00	82.9	0.0	0.0	17.1	117.17	No	
							Iron	NC	30400 - 45400	4.54E+04	2/2	--	--	--	--	2.07E+00	93.6	0.0	0.0	6.4	58000	No	
							Manganese	NC	698 - 939	9.39E+02	2/2	--	--	--	--	1.11E+00	44.9	0.0	2.9	52.2	1431	No	
							Nickel	NC	1060 - 1490	1.49E+03	2/2	1.53E-07	--	--	--	4.93E+00	19.3	0.0	1.0	79.6	*	No	
45	RD	046082	4E-04	6E+01	3E+01	Metal	Antimony	NC	3.4 - 22.3	2.23E+01	2/3	--	--	--	--	2.18E+00	32.7	0.0	0.0	67.3	9.05	Yes	
							Arsenic	C	1.4 - 15.2	1.52E+01	3/3	3.97E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	Yes
							Copper	NC	45.9 - 5230	5.23E+03	3/3	--	--	--	--	3.29E+01	5.5	0.0	0.0	94.5	124.31	Yes	
							Iron	NC	40800 - 49900	4.99E+04	3/3	--	--	--	--	2.27E+00	93.6	0.0	0.0	6.4	58000	No	
							Lead	--	3.8 - 4850	4.85E+03	3/3	--	--	--	--	--	--	--	--	--	8.99	Yes	
							Manganese	NC	913 - 1180	1.18E+03	3/3	--	--	--	--	1.40E+00	44.9	0.0	2.9	52.2	1431	No	
							Mercury	NC	0.13 - 17	1.70E+01	3/3	--	--	--	--	1.07E+01	6.8	0.0	0.0	93.2	2.28	Yes	
							Nickel	NC	142 - 1030	1.03E+03	3/3	1.06E-07	--	--	--	3.41E+00	19.3	0.0	1.0	79.6	*	No	
							Vanadium	NC	49.4 - 93.9	9.39E+01	3/3	--	--	--	--	1.45E+00	82.9	0.0	0.0	17.1	117.17	No	
							Zinc	NC	48.9 - 2220	2.22E+03	3/3	--	--	--	--	5.95E+00	1.6	0.0	0.0	98.4	109.86	Yes	
						PAH	Benzo(a)pyrene	C	0.093 - 0.093	9.30E-02	1/3	2.49E-06	70.1	28.8	0.0	1.1	--	--	--	--	--	--	
						Pest/PCB	Aroclor-1260	C/NC	1.4 - 1.4	1.40E+00	1/3	6.63E-06	66.1	29.2	0.0	4.7	1.29E+00	69.6	27.3	0.0	3.1	--	--
45	RD	047074	3E-04	1E+01	6E+00	Metal	Arsenic	C	12 - 12	1.20E+01	1/1	3.13E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	Yes
							Copper	NC	176 - 176	1.76E+02	1/1	--	--	--	--	--	1.11E+00	5.5	0.0	0.0	94.5	124.31	Yes
							Iron	NC	38100 - 38100	3.81E+04	1/1	--	--	--	--	--	1.73E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	5260 - 5260	5.26E+03	1/1	--	--	--	--	--	6.24E+00	44.9	0.0	2.9	52.2	1431	Yes
45	RD	047075	2E-05	1E+01	6E+00	Metal	Vanadium	NC	88.8 - 88.8	8.88E+01	1/1	--	--	--	--	1.37E+00	82.9	0.0	0.0	17.1	117.17	No	
							Arsenic	C	0.73 - 0.73	7.30E-01	1/1	1.91E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	43500 - 43500	4.35E+04	1/1	--	--	--	--	--	1.98E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	1780 - 1780	1.78E+03	1/1	1.83E-07	--	--	--	--	5.89E+00	19.3	0.0	1.0	79.6	*	No
45	RD	047076	1E-04	1E+01	5E+00	Metal	Arsenic	C	3.4 - 4.8	4.80E+00	2/6	1.25E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	13900 - 53500	4.42E+04	6/6	--	--	--	--	--	2.01E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	213 - 1020	9.51E+02	6/6	--	--	--	--	--	1.13E+00	44.9	0.0	2.9	52.2	1431	No
							Mercury	NC	0.1 - 5.4	5.40E+00	4/6	--	--	--	--	--	3.39E+00	6.8	0.0	0.0	93.2	2.28	Yes
45	RD	047077	2E-04	1E+01	3E+00	Metal	Nickel	NC	43.9 - 612	4.14E+02	6/6	4.26E-08	--	--	--	--	1.37E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	36.5 - 76.8	7.20E+01	6/6	--	--	--	--	--	1.11E+00	82.9	0.0	0.0	17.1	117.17	No
							Arsenic	C	4.7 - 8.6	7.72E+00	4/6	2.02E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	31100 - 42700	4.07E+04	6/6	--	--	--	--	--	1.85E+00	93.6	0.0	0.0	6.4	58000	No
45	RD	047086	8E-05	5E+00	<1	Metal	Manganese	NC	541 - 1270	1.09E+03	6/6	--	--	--	--	--	1.29E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	34.5 - 1400	1.05E+03	6/6	1.08E-07	--	--	--	--	3.49E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	27 - 80	6.85E+01	6/6	--	--	--	--	--	1.06E+00	82.9	0.0	0.0	17.1	117.17	No
							Arsenic	C	3.1 - 3.1	3.10E+00	1/1	8.10E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
45	RD	047089	1E-04	9E+00	2E+00	Metal	Iron	NC	25600 - 25600	2.56E+04	1/1	--	--	--	--	--	1.17E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	1040 - 1040	1.04E+03	1/1	--	--	--	--	--	1.23E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	347 - 347	3.47E+02	1/1	3.57E-08	--	--	--	--	1.15E+00	19.3	0.0	1.0	79.6	*	No
							Arsenic	C	5.4 - 5.4	5.40E+00	1/1	1.41E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
45	RD	047092	2E-07	7E+00	4E+00	Metal	Copper	NC	188 - 188	1.88E+02	1/1	--	--	--	--	--	1.18E+00	5.5	0.0	0.0	94.5	124.31	Yes
							Iron	NC	41100 - 41100	4.11E+04	1/1	--	--	--	--	--	1.87E+00	93.6	0.0	0.0	6.4	58000	No
							Lead	--	1080 - 1080	1.08E+03	1/1	--	--	--	--	--	--	--	--	--	--	8.99	Yes
							Manganese	NC	991 - 991	9.91E+02	1/1	--	--	--	--	--	1.18E+00	44.9	0.0	2.9	52.2	1431	No
45	RD	047092	2E-07	7E+00	4E+00	Metal	Zinc	NC	401 - 401	4.01E+02	1/1	--	--	--	--	--	1.07E+00	1.6	0.0	0.0	98.4	109.86	Yes
							Pest/PCB	Aroclor-1260	C	0.75 - 0.75	7.50E-01	1/1	3.55E-06	66.1	29.2	0.0	4.7	<1	--	--	--	--	--
							Iron	NC	36400 - 36400	3.64E+04	1/1	--	--	--	--	--	1.66E+00	93.6	0.0	0.0	6.4	58000	No
45	RD	047092	2E-07	7E+00	4E+00	Metal	Lead	--	187 - 187	1.87E+02	1/1	--	--	--	--	--	--	--	--	--	8.99	Yes	
							Nickel	NC	1110 - 1110	1.11E+03	1/1	1.14E-07	--	--	--	--	--	3.67E+00	19.3	0.0	1.0	79.6	*

TABLE 5-6: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals	
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?
45	RD	048072	1E-04	1E+01	7E+00	Metal	Arsenic	C	2 - 4.5	4.50E+00	2/4	1.18E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	12200 - 61100	6.11E+04	4/4	--	--	--	--	--	2.78E+00	93.6	0.0	0.0	6.4	58000	Yes
							Manganese	NC	219 - 1030	1.03E+03	4/4	--	--	--	--	--	1.22E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	34.5 - 2400	2.20E+03	4/4	2.27E-07	--	--	--	--	7.30E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	37.2 - 75.7	7.57E+01	4/4	--	--	--	--	--	1.17E+00	82.9	0.0	0.0	17.1	117.17	No
						PAH	Benzo(a)pyrene	C	0.46 - 0.46	4.60E-01	1/4	1.23E-05	70.1	28.8	0.0	1.1	--	--	--	--	--	--	--
45	RD	048075	1E-07	6E+00	3E+00	Metal	Iron	NC	29300 - 29300	2.93E+04	1/1	--	--	--	--	--	1.33E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	868 - 868	8.68E+02	1/1	8.93E-08	--	--	--	--	2.87E+00	19.3	0.0	1.0	79.6	*	No
45	RD	048076	2E-07	7E+00	4E+00	Metal	Iron	NC	24700 - 24700	2.47E+04	1/1	--	--	--	--	--	1.12E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	1080 - 1080	1.08E+03	1/1	1.11E-07	--	--	--	--	3.58E+00	19.3	0.0	1.0	79.6	*	No
45	RD	048077	3E-05	1E+01	6E+00	Metal	Arsenic	C	1.3 - 1.3	1.30E+00	1/1	3.40E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	46000 - 46000	4.60E+04	1/1	--	--	--	--	--	2.09E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	1080 - 1080	1.08E+03	1/1	--	--	--	--	--	1.28E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	1800 - 1800	1.80E+03	1/1	1.85E-07	--	--	--	--	5.96E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	74.8 - 74.8	7.48E+01	1/1	--	--	--	--	--	1.15E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	048080	2E-04	8E+01	7E+01	Metal	Antimony	NC	29 - 29	2.90E+01	1/3	--	--	--	--	--	2.84E+00	32.7	0.0	0.0	67.3	9.05	Yes
							Arsenic	C	5.7 - 7.8	7.80E+00	3/3	2.04E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Copper	NC	52.3 - 10400	1.04E+04	3/3	--	--	--	--	--	6.53E+01	5.5	0.0	0.0	94.5	124.31	Yes
							Iron	NC	32400 - 40300	4.03E+04	3/3	--	--	--	--	--	1.83E+00	93.6	0.0	0.0	6.4	58000	No
							Lead	--	5.9 - 1900	1.90E+03	3/3	--	--	--	--	--	--	--	--	--	--	8.99	Yes
							Nickel	NC	323 - 416	4.16E+02	3/3	4.28E-08	--	--	--	--	1.38E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	65.8 - 74	7.40E+01	3/3	--	--	--	--	--	1.14E+00	82.9	0.0	0.0	17.1	117.17	No
							Zinc	NC	59.5 - 784	7.84E+02	3/3	--	--	--	--	--	2.10E+00	1.6	0.0	0.0	98.4	109.86	Yes
						Pest/PCB	Aroclor-1260	C/NC	1.4 - 1.4	1.40E+00	1/3	6.63E-06	66.1	29.2	0.0	4.7	1.29E+00	69.6	27.3	0.0	3.1	--	--
45	RD	048089	2E-04	1E+01	3E+00	Metal	Arsenic	C	6.3 - 8.5	8.50E+00	3/3	2.22E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	45300 - 59300	5.93E+04	3/3	--	--	--	--	--	2.70E+00	93.6	0.0	0.0	6.4	58000	Yes
							Manganese	NC	791 - 1340	1.34E+03	3/3	--	--	--	--	--	1.59E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	233 - 639	6.39E+02	3/3	6.57E-08	--	--	--	--	2.12E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	77 - 108	1.08E+02	3/3	--	--	--	--	--	1.67E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	049075	4E-05	8E+00	3E+00	Metal	Arsenic	C	1.6 - 1.6	1.60E+00	1/2	4.18E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	33800 - 47200	4.72E+04	2/2	--	--	--	--	--	2.15E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	1060 - 2380	2.38E+03	2/2	--	--	--	--	--	2.82E+00	44.9	0.0	2.9	52.2	1431	Yes
							Vanadium	NC	70.5 - 85	8.50E+01	2/2	--	--	--	--	--	1.31E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	049076	3E-04	8E+00	2E+00	Metal	Arsenic	C	4 - 9.6	9.60E+00	2/2	2.51E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	45200 - 46900	4.69E+04	2/2	--	--	--	--	--	2.14E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	509 - 560	5.60E+02	2/2	5.76E-08	--	--	--	--	1.85E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	76.9 - 78.8	7.88E+01	2/2	--	--	--	--	--	1.22E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	049077	2E-07	9E+00	5E+00	Metal	Iron	NC	39100 - 39100	3.91E+04	1/1	--	--	--	--	--	1.78E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	1430 - 1430	1.43E+03	1/1	1.47E-07	--	--	--	--	4.73E+00	19.3	0.0	1.0	79.6	*	No
45	RD	049079	3E-04	2E+01	5E+00	Metal	Arsenic	C	7 - 10.9	1.09E+01	2/3	2.85E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Cadmium	NC	4 - 4	4.00E+00	1/3	6.78E-09	--	--	--	--	1.16E+00	8.8	0.0	0.0	91.1	3.14	Yes
							Copper	NC	12.1 - 619	6.19E+02	3/3	--	--	--	--	--	3.89E+00	5.5	0.0	0.0	94.5	124.31	Yes
							Iron	NC	28400 - 41800	4.18E+04	3/3	--	--	--	--	--	1.90E+00	93.6	0.0	0.0	6.4	58000	No
							Lead	--	2 - 1070	1.07E+03	3/3	--	--	--	--	--	--	--	--	--	--	8.99	Yes
							Manganese	NC	668 - 849	8.49E+02	3/3	--	--	--	--	--	1.01E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	90.6 - 1430	1.43E+03	3/3	1.47E-07	--	--	--	--	4.73E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	21.9 - 76.4	7.64E+01	3/3	--	--	--	--	--	1.18E+00	82.9	0.0	0.0	17.1	117.17	No
						Pest/PCB	Aroclor-1260	C/NC	3.3 - 3.3	3.30E+00	1/3	1.56E-05	66.1	29.2	0.0	4.7	3.03E+00	69.6	27.3	0.0	3.1	--	--
45	RD	049085	3E-07	1E+01	6E+00	Metal	Iron	NC	44600 - 52000	5.20E+04	4/4	--	--	--	--	--	2.37E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	597 - 1080	1.08E+03	4/4	--	--	--	--	--	1.28E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	1310 - 1820	1.78E+03	4/4	1.83E-07	--	--	--	--	5.90E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	42.4 - 67.2	6.50E+01	4/4	--	--	--	--	--	1.00E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	049088	3E-04	1E+01	5E+00	Metal	Arsenic	C	3.4 - 11.3	1.13E+01	3/4	2.95E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	Yes
							Iron	NC	33300 - 43800	4.27E+04	4/4	--	--	--	--	--	1.94E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	276 - 1740	1.56E+03	4/4	1.60E-07	--	--	--	--	5.16E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	14.5 - 76.5	7.65E+01	4/4	--	--	--	--	--	1.18E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	049089	3E-04	1E+01	6E+00	Metal	Arsenic	C	2.5 - 10.1	1.01E+01	3/4	2.64E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	37900 - 50600	5.06E+04	4/4	--	--	--	--	--	2.30E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	689 - 891	8.71E+02	4/4	--	--	--	--	--	1.03E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	359 - 1810	1.72E+03	4/4	1.77E-07	--	--	--	--	5.69E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	24.6 - 114	1.14E+02	4/4	--	--	--	--	--	1.76E+00	82.9	0.0	0.0	17.1	117.17	No

TABLE 5-6: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals	
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?
45	RD	049091	3E-04	1E+01	6E+00	Metal	Antimony	NC	5.3 - 15.1	1.51E+01	3/4	--	--	--	--	1.48E+00	32.7	0.0	0.0	67.3	9.05	Yes	
							Arsenic	C	1.2 - 9.9	9.90E+00	4/4	2.59E-04	56.6	5.4	0.0	38.0	<1	--	--	--	11.1	No	
							Iron	NC	38200 - 48100	4.75E+04	4/4	--	--	--	--	2.16E+00	93.6	0.0	0.0	6.4	58000	No	
							Nickel	NC	139 - 1960	1.78E+03	4/4	1.83E-07	--	--	--	--	5.90E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	19.8 - 73.8	7.38E+01	4/4	--	--	--	--	--	1.14E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	050071	2E-07	1E+01	4E+00	Metal	Iron	NC	47000 - 54200	5.42E+04	2/2	--	--	--	--	--	2.47E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	1270 - 1510	1.51E+03	2/2	--	--	--	--	--	1.79E+00	44.9	0.0	2.9	52.2	1431	Yes
							Nickel	NC	926 - 1270	1.27E+03	2/2	1.31E-07	--	--	--	--	4.20E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	66.3 - 89.1	8.91E+01	2/2	--	--	--	--	--	1.37E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	050074	2E-07	8E+00	3E+00	Metal	Iron	NC	45400 - 45400	4.54E+04	1/1	--	--	--	--	--	2.07E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	956 - 956	9.56E+02	1/1	--	--	--	--	--	1.13E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	835 - 835	8.35E+02	1/1	8.59E-08	--	--	--	--	2.76E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	66.4 - 66.4	6.64E+01	1/1	--	--	--	--	--	1.02E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	050077	3E-04	1E+01	5E+00	Metal	Arsenic	C	5.7 - 9.7	9.70E+00	2/3	2.53E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	12500 - 39600	3.96E+04	3/3	--	--	--	--	--	1.80E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	344 - 1550	1.55E+03	3/3	1.59E-07	--	--	--	--	5.13E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	12.1 - 121	1.21E+02	3/3	--	--	--	--	--	1.87E+00	82.9	0.0	0.0	17.1	117.17	Yes
						Pest/PCB	Aroclor-1260	C/NC	1.1 - 1.1	1.10E+00	1/3	5.21E-06	66.1	29.2	0.0	4.7	1.01E+00	69.6	27.3	0.0	3.1	--	--
45	RD	050080	4E-04	1E+01	5E+00	Metal	Arsenic	C/NC	1.4 - 16.7	1.67E+01	3/3	4.36E-04	56.6	5.4	0.0	38.0	1.07E+00	66.8	5.6	0.1	27.5	11.1	Yes
							Iron	NC	41300 - 62400	6.24E+04	3/3	--	--	--	--	--	2.84E+00	93.6	0.0	0.0	6.4	58000	Yes
							Manganese	NC	741 - 931	9.31E+02	3/3	--	--	--	--	--	1.10E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	284 - 1590	1.59E+03	3/3	1.64E-07	--	--	--	--	5.26E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	46.7 - 89	8.90E+01	3/3	--	--	--	--	--	1.37E+00	82.9	0.0	0.0	17.1	117.17	No
						PAH	Benzo(a)pyrene	C	0.04 - 0.04	4.00E-02	1/3	1.07E-06	70.1	28.8	0.0	1.1	--	--	--	--	--	--	--
45	RD	050083	3E-08	7E+00	3E+00	Metal	Iron	NC	38300 - 38300	3.83E+04	1/1	--	--	--	--	--	1.74E+00	93.6	0.0	0.0	6.4	58000	No
							Mercury	NC	2.3 - 2.3	2.30E+00	1/1	--	--	--	--	--	1.45E+00	6.8	0.0	0.0	93.2	2.28	Yes
							Vanadium	NC	114 - 114	1.14E+02	1/1	--	--	--	--	--	1.76E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	050084	2E-04	1E+01	6E+00	Metal	Arsenic	C	6 - 6	6.00E+00	1/1	1.57E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	49900 - 49900	4.99E+04	1/1	--	--	--	--	--	2.27E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	845 - 845	8.45E+02	1/1	--	--	--	--	--	1.00E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	1850 - 1850	1.85E+03	1/1	1.90E-07	--	--	--	--	6.12E+00	19.3	0.0	1.0	79.6	*	No
45	RD	050086	1E-04	6E+00	2E+00	Metal	Arsenic	C	3.8 - 3.8	3.80E+00	1/1	9.93E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	32500 - 32500	3.25E+04	1/1	--	--	--	--	--	1.48E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	660 - 660	6.60E+02	1/1	6.79E-08	--	--	--	--	2.18E+00	19.3	0.0	1.0	79.6	*	No
						SVOC	Pentachlorophenol	C	10 - 10	1.00E+01	1/1	3.85E-06	48.8	38.5	0.0	12.6	<1	--	--	--	--	--	--
45	RD	050088	3E-07	9E+00	6E+00	Metal	Iron	NC	43400 - 43400	4.34E+04	1/1	--	--	--	--	--	1.98E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	1770 - 1770	1.77E+03	1/1	1.82E-07	--	--	--	--	5.86E+00	19.3	0.0	1.0	79.6	*	No
45	RD	051072	3E-05	8E+00	4E+00	Metal	Arsenic	C	1.1 - 1.1	1.10E+00	1/1	2.87E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	40600 - 40600	4.06E+04	1/1	--	--	--	--	--	1.85E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	1130 - 1130	1.13E+03	1/1	1.16E-07	--	--	--	--	3.74E+00	19.3	0.0	1.0	79.6	*	No
45	RD	051076	2E-07	8E+00	4E+00	Metal	Iron	NC	38000 - 38000	3.80E+04	1/1	--	--	--	--	--	1.73E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	1100 - 1100	1.10E+03	1/1	1.13E-07	--	--	--	--	3.64E+00	19.3	0.0	1.0	79.6	*	No
45	RD	051086	2E-07	8E+00	4E+00	Metal	Iron	NC	38300 - 38300	3.83E+04	1/1	--	--	--	--	--	1.74E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	909 - 909	9.09E+02	1/1	--	--	--	--	--	1.08E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	1190 - 1190	1.19E+03	1/1	1.22E-07	--	--	--	--	3.94E+00	19.3	0.0	1.0	79.6	*	No
45	RD	052071	4E-07	1E+01	9E+00	Metal	Iron	NC	45800 - 48600	4.86E+04	2/2	--	--	--	--	--	2.21E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	770 - 902	9.02E+02	2/2	--	--	--	--	--	1.07E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	2420 - 2690	2.69E+03	2/2	2.77E-07	--	--	--	--	8.90E+00	19.3	0.0	1.0	79.6	*	No
45	RD	052075	9E-05	2E+01	6E+00	Metal	Arsenic	C	1.1 - 3.4	3.40E+00	2/3	8.88E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	41600 - 55400	5.54E+04	3/3	--	--	--	--	--	2.52E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	690 - 3370	3.37E+03	3/3	--	--	--	--	--	4.00E+00	44.9	0.0	2.9	52.2	1431	Yes
							Nickel	NC	297 - 1880	1.88E+03	3/3	1.93E-07	--	--	--	--	6.22E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	34.2 - 121	1.21E+02	3/3	--	--	--	--	--	1.87E+00	82.9	0.0	0.0	17.1	117.17	Yes
45	RD	052082	2E-04	1E+01	3E+00	Metal	Arsenic	C	8.5 - 8.5	8.50E+00	1/1	2.22E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	44200 - 51800	5.10E+04	4/4	--	--	--	--	--	2.32E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	819 - 1080	1.08E+03	4/4	--	--	--	--	--	1.28E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	852 - 1060	1.03E+03	4/4	1.06E-07	--	--	--	--	3.41E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	59.9 - 99.9	9.70E+01	4/4	--	--	--	--	--	1.50E+00	82.9	0.0	0.0	17.1	117.17	No

TABLE 5-6: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals		
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?	
45	RD	052083	4E-04	3E+01	2E+01	Metal	Arsenic	C/NC	16.4 - 16.4	1.64E+01	1/1	4.28E-04	56.6	5.4	0.0	38.0	1.05E+00	66.8	5.6	0.1	27.5	11.1	Yes
							Copper	NC	3400 - 3400	3.40E+03	1/1	--	--	--	--	--	2.14E+01	5.5	0.0	0.0	94.5	124.31	Yes
							Lead	--	367 - 367	3.67E+02	1/1	--	--	--	--	--	--	--	--	--	--	8.99	Yes
							Mercury	NC	10 - 10	1.00E+01	1/1	--	--	--	--	--	6.28E+00	6.8	0.0	0.0	93.2	2.28	Yes
							Zinc	NC	582 - 582	5.82E+02	1/1	--	--	--	--	--	1.56E+00	1.6	0.0	0.0	98.4	109.86	Yes
45	RD	052085	5E-07	1E+01	5E+00	Metal	Iron	NC	26300 - 39500	3.90E+04	4/4	--	--	--	--	--	1.78E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	373 - 1590	1.59E+03	4/4	--	--	--	--	--	1.89E+00	44.9	0.0	2.9	52.2	1431	Yes
							Nickel	NC	216 - 1370	1.37E+03	4/4	1.41E-07	--	--	--	--	4.53E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	49.1 - 75.2	7.52E+01	4/4	--	--	--	--	--	1.16E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	053080	2E-04	5E+00	2E+00	Metal	Arsenic	C	6.6 - 6.6	6.60E+00	1/1	1.72E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	39100 - 39100	3.91E+04	1/1	--	--	--	--	--	1.78E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	972 - 972	9.72E+02	1/1	--	--	--	--	--	1.15E+00	44.9	0.0	2.9	52.2	1431	No
45	RD	053081	3E-04	1E+01	5E+00	Metal	Arsenic	C	12.6 - 12.6	1.26E+01	1/1	3.29E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	Yes
							Cadmium	NC	11.3 - 11.3	1.13E+01	1/4	1.92E-08	--	--	--	--	3.27E+00	8.8	0.0	0.0	91.1	3.14	Yes
							Iron	NC	37000 - 46500	4.65E+04	4/4	--	--	--	--	--	2.12E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	435 - 1600	1.57E+03	4/4	1.62E-07	--	--	--	--	5.21E+00	19.3	0.0	1.0	79.6	*	No
45	RD	053082	2E-07	6E+00	2E+00	Metal	Iron	NC	37100 - 37100	3.71E+04	1/1	--	--	--	--	--	1.69E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	420 - 420	4.20E+02	1/1	4.32E-08	--	--	--	--	1.39E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	82.6 - 82.6	8.26E+01	1/1	--	--	--	--	--	1.27E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	053083	9E-05	9E+00	2E+00	Metal	Arsenic	C	1.9 - 3.3	3.30E+00	2/2	8.62E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	33400 - 39200	3.92E+04	2/2	--	--	--	--	--	1.78E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	716 - 869	8.69E+02	2/2	--	--	--	--	--	1.03E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	527 - 612	6.12E+02	2/2	6.29E-08	--	--	--	--	2.03E+00	19.3	0.0	1.0	79.6	*	No
							Thallium	NC	5.5 - 5.5	5.50E+00	1/2	--	--	--	--	--	1.09E+00	97.3	0.0	0.0	2.7	0.81	Yes
							Vanadium	NC	72.8 - 75.7	7.57E+01	2/2	--	--	--	--	--	1.17E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	053085	1E-04	1E+01	6E+00	Metal	Arsenic	C	1.5 - 5	4.51E+00	4/4	1.18E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	21600 - 42300	4.23E+04	4/4	--	--	--	--	--	1.93E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	374 - 1670	1.52E+03	4/4	--	--	--	--	--	1.80E+00	44.9	0.0	2.9	52.2	1431	Yes
							Nickel	NC	25.2 - 1910	1.84E+03	4/4	1.90E-07	--	--	--	--	6.10E+00	19.3	0.0	1.0	79.6	*	No
						SVOC	Bis(2-ethylhexyl)phthalate	C	3.6 - 3.6	3.60E+00	1/4	3.15E-06	2.5	0.8	0.0	96.7	<1	--	--	--	--	--	--
45	RD	054071	4E-07	1E+01	7E+00	Metal	Iron	NC	52500 - 53800	5.38E+04	2/2	--	--	--	--	--	2.45E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	982 - 1200	1.20E+03	2/2	--	--	--	--	--	1.42E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	93.9 - 2260	2.26E+03	2/2	2.32E-07	--	--	--	--	7.48E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	32.8 - 109	1.09E+02	2/2	--	--	--	--	--	1.68E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	054074	1E-04	1E+01	3E+00	Metal	Arsenic	C	3.9 - 5.3	5.30E+00	2/3	1.38E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	26200 - 76500	7.65E+04	3/3	--	--	--	--	--	3.48E+00	93.6	0.0	0.0	6.4	58000	Yes
							Lead	--	3.5 - 597	5.97E+02	3/3	--	--	--	--	--	--	--	--	--	--	8.99	Yes
							Manganese	NC	368 - 1540	1.54E+03	3/3	--	--	--	--	--	1.83E+00	44.9	0.0	2.9	52.2	1431	Yes
						Pest/PCB	Aroclor-1260	C	0.32 - 0.32	3.20E-01	1/3	1.52E-06	66.1	29.2	0.0	4.7	<1	--	--	--	--	--	--
45	RD	054075	1E-04	1E+01	3E+00	Metal	Arsenic	C	4.2 - 5.7	5.70E+00	2/2	1.49E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	33400 - 40500	4.05E+04	2/2	--	--	--	--	--	1.84E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	680 - 2410	2.41E+03	2/2	--	--	--	--	--	2.86E+00	44.9	0.0	2.9	52.2	1431	Yes
							Nickel	NC	130 - 850	8.50E+02	2/2	8.74E-08	--	--	--	--	2.81E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	70.1 - 78.6	7.86E+01	2/2	--	--	--	--	--	1.21E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	054077	5E-05	1E+01	4E+00	Metal	Arsenic	C	0.68 - 2	2.00E+00	2/2	5.22E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	38200 - 42000	4.20E+04	2/2	--	--	--	--	--	1.91E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	797 - 1060	1.06E+03	2/2	--	--	--	--	--	1.26E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	887 - 1080	1.08E+03	2/2	1.11E-07	--	--	--	--	3.58E+00	19.3	0.0	1.0	79.6	*	No
							Thallium	NC	2.8 - 6.8	6.80E+00	2/2	--	--	--	--	--	1.35E+00	97.3	0.0	0.0	2.7	0.81	Yes
45	RD	054079	1E-04	1E+01	4E+00	Metal	Arsenic	C	1.6 - 4.8	4.80E+00	2/2	1.25E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	38800 - 40000	4.00E+04	2/2	--	--	--	--	--	1.82E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	628 - 1060	1.06E+03	2/2	1.09E-07	--	--	--	--	3.51E+00	19.3	0.0	1.0	79.6	*	No
							Thallium	NC	5 - 5.9	5.90E+00	2/2	--	--	--	--	--	1.17E+00	97.3	0.0	0.0	2.7	0.81	Yes
							Vanadium	NC	50.5 - 73.4	7.34E+01	2/2	--	--	--	--	--	1.13E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	054081	1E-04	1E+01	3E+00	Metal	Arsenic	C	1.6 - 4.1	4.10E+00	2/2	1.07E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	34800 - 36100	3.61E+04	2/2	--	--	--	--	--	1.64E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	741 - 1890	1.89E+03	2/2	--	--	--	--	--	2.24E+00	44.9	0.0	2.9	52.2	1431	Yes
							Nickel	NC	442 - 820	8.20E+02	2/2	8.43E-08	--	--	--	--	2.71E+00	19.3	0.0	1.0	79.6	*	No
							Thallium	NC	6.6 - 6.6	6.60E+00	1/2	--	--	--	--	--	1.31E+00	97.3	0.0	0.0	2.7	0.81	Yes
							Vanadium	NC	52.7 - 76	7.60E+01	2/2	--	--	--	--	--	1.17E+00	82.9	0.0	0.0	17.1	117.17	No

TABLE 5-6: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS) BY PLANNED REUSE (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals	
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?
45	RD	055073	6E-05	1E+01	6E+00	Metal	Arsenic	C	2.1 - 2.1	2.10E+00	1/2	5.49E-05	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	47100 - 57000	5.70E+04	2/2	--	--	--	--	--	2.60E+00	93.6	0.0	0.0	6.4	58000	No
							Manganese	NC	942 - 1710	1.71E+03	2/2	--	--	--	--	--	2.03E+00	44.9	0.0	2.9	52.2	1431	Yes
							Nickel	NC	421 - 1730	1.73E+03	2/2	1.78E-07	--	--	--	--	5.73E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	41.4 - 100	1.00E+02	2/2	--	--	--	--	--	1.54E+00	82.9	0.0	0.0	17.1	117.17	No
45	RD	055078	1E-04	1E+01	5E+00	Metal	Arsenic	C	5 - 5.5	5.50E+00	2/4	1.44E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Iron	NC	38400 - 43700	4.37E+04	4/4	--	--	--	--	--	1.99E+00	93.6	0.0	0.0	6.4	58000	No
							Nickel	NC	428 - 1540	1.48E+03	4/4	1.52E-07	--	--	--	--	4.88E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	30.6 - 77.3	7.73E+01	4/4	--	--	--	--	--	1.19E+00	82.9	0.0	0.0	17.1	117.17	No
							Iron	NC	48400 - 48400	4.84E+04	1/1	--	--	--	--	--	2.20E+00	93.6	0.0	0.0	6.4	58000	No
45	RD	058078	1E-07	7E+00	2E+00	Metal	Manganese	NC	941 - 941	9.41E+02	1/1	--	--	--	--	--	1.12E+00	44.9	0.0	2.9	52.2	1431	No
							Nickel	NC	387 - 387	3.87E+02	1/1	3.98E-08	--	--	--	--	1.28E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	101 - 101	1.01E+02	1/1	--	--	--	--	--	1.56E+00	82.9	0.0	0.0	17.1	117.17	No
							Arsenic	C	5.5 - 5.7	5.70E+00	2/7	1.49E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	11.1	No
							Cadmium	NC	4.7 - 4.7	4.70E+00	1/8	7.97E-09	--	--	--	--	1.36E+00	8.8	0.0	0.0	91.1	3.14	Yes
45	RD	059078	1E-04	1E+01	3E+00	Metal	Iron	NC	10400 - 65400	5.04E+04	8/8	--	--	--	--	--	2.30E+00	93.6	0.0	0.0	6.4	58000	Yes
							Manganese	NC	209 - 2660	1.63E+03	8/8	--	--	--	--	--	1.94E+00	44.9	0.0	2.9	52.2	1431	Yes
							Nickel	NC	27.3 - 973	6.81E+02	8/8	7.00E-08	--	--	--	--	2.25E+00	19.3	0.0	1.0	79.6	*	No
							Vanadium	NC	28 - 175	1.11E+02	8/8	--	--	--	--	--	1.71E+00	82.9	0.0	0.0	17.1	117.17	Yes
							Arsenic	NC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EMI-1	MI	AZ35	5E-06	<1	<1	Metal	Arsenic	C	1.5 - 1.5	1.50E+00	1/1	3.46E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BA34	2E-05	<1	<1	Metal	Arsenic	C	0.79 - 12	7.10E+00	7/9	1.64E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.052 - 0.46	4.60E-01	3/21	2.62E-06	36.8	63.2	0.0		--	--	--	--		--	--
EMI-1	MI	BA35	9E-06	<1	<1	Metal	Arsenic	C	0.57 - 3.9	3.90E+00	5/5	8.99E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BB32	2E-05	<1	<1	Metal	Arsenic	C	3.8 - 3.8	3.80E+00	1/9	8.76E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.043 - 0.6	6.00E-01	2/12	3.42E-06	36.8	63.2	0.0		--	--	--	--		--	--
						Pest/PCB	Aroclor-1260	C	0.019 - 1.5	1.50E+00	3/12	1.49E-06	35.1	64.9	0.0		<1	--	--	--		--	--
EMI-1	MI	BB33	4E-05	<1	<1	Metal	Arsenic	C	2.7 - 13	1.30E+01	10/15	3.00E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.039 - 0.38	3.42E-01	4/25	1.95E-06	36.8	63.2	0.0		--	--	--	--		--	--
						Pest/PCB	Aroclor-1254	C	1.9 - 6.9	6.90E+00	2/25	6.87E-06	35.1	64.9	0.0		<1	--	--	--		--	--
EMI-1	MI	BB34	2E-05	<1	<1	Metal	Arsenic	C	3.2 - 14.5	7.20E+00	11/24	1.66E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
EMI-1	MI	BB35	1E-05	<1	<1	Metal	Arsenic	C	0.81 - 6.6	6.02E+00	4/4	1.39E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BC32	7E-06	<1	<1	Metal	Arsenic	C	0.53 - 3.2	3.20E+00	2/2	7.38E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BC33	3E-05	<1	<1	Metal	Arsenic	C	0.59 - 14.5	9.86E+00	10/12	2.27E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
EMI-1	MI	BC34	2E-05	<1	<1	Metal	Arsenic	C	1.4 - 7.8	7.80E+00	2/4	1.80E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BC35	9E-06	<1	<1	Metal	Arsenic	C	3.9 - 3.9	3.90E+00	1/2	8.99E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BD32	1E-04	<1	<1	Metal	Arsenic	C	3.5 - 48.6	4.86E+01	6/10	1.12E-04	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
EMI-1	MI	BD33	3E-05	<1	<1	Metal	Arsenic	C	0.85 - 62	1.15E+01	25/26	2.64E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.081 - 0.99	5.78E-01	4/21	3.29E-06	36.8	63.2	0.0		--	--	--	--		--	--
EMI-1	MI	BD34	3E-05	<1	<1	Metal	Arsenic	C	0.67 - 14.5	9.23E+00	15/20	2.13E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						Pest/PCB	Aroclor-1254	C	0.087 - 3.3	3.30E+00	3/17	3.28E-06	35.1	64.9	0.0		<1	--	--	--		--	--
EMI-1	MI	BE30	1E-05	<1	<1	Metal	Arsenic	C	3.6 - 5.1	4.50E+00	4/7	1.04E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BE31	3E-05	<1	<1	Metal	Arsenic	C	1.2 - 12	1.20E+01	4/5	2.77E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
EMI-1	MI	BE32	5E-05	<1	<1	Metal	Arsenic	C	0.87 - 9.2	6.57E+00	8/10	1.51E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)anthracene	C	0.076 - 2.9	2.67E+00	6/12	1.52E-06	36.8	63.2	0.0		--	--	--	--		--	--
							Benzo(a)pyrene	C	0.096 - 5.3	4.18E+00	6/12	2.38E-05	36.8	63.2	0.0		--	--	--	--		--	--
							Benzo(b)fluoranthene	C	0.064 - 4.2	4.05E+00	9/12	2.30E-06	36.8	63.2	0.0		--	--	--	--		--	--
							Benzo(k)fluoranthene	C	0.043 - 3.2	3.20E+00	8/12	1.82E-06	36.8	63.2	0.0		--	--	--	--		--	--
EMI-1	MI	BE33	2E-05	<1	<1	Metal	Arsenic	C	1.6 - 12	6.25E+00	44/45	1.44E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.039 - 3.9	4.72E-01	15/45	2.69E-06	36.8	63.2	0.0		--	--	--	--		--	--
EMI-1	MI	BE34	5E-05	3E+00	3E+00	Metal	Arsenic	C	2.5 - 11.8	4.91E+00	17/26	1.13E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						Pest/PCB	Aroclor-1254	C/NC	30 - 38	3.80E+01	2/25	3.78E-05	35.1	64.9	0.0		2.65E+00	35.1	64.9	0.0		--	--
EMI-1	MI	BF31	1E-04	<1	<1	Metal	Arsenic	C	0.76 - 58.1	5.81E+01	6/6	1.34E-04	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
							Lead	--	16 - 4300	4.30E+03	6/6	--	--	--	--		--	--	--	--		8.99	Yes
EMI-1	MI	BF32	2E-05	<1	<1	Metal	Arsenic	C	5.5 - 9.7	9.70E+00	2/3	2.24E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BF33	1E-05	<1	<1	Metal	Arsenic	C	4.1 - 6.2	5.76E+00	5/5	1.33E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BF34	1E-05	<1	<1	Metal	Arsenic	C	2.4 - 7.5	5.61E+00	10/10	1.29E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.038 - 0.36	2.10E-01	4/10	1.20E-06	36.8	63.2	0.0		--	--	--	--		--	--
EMI-1	MI	BG32	6E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.27 - 0.7	7.00E-01	2/9	3.99E-06	36.8	63.2	0.0		--	--	--	--		--	--
EMI-1	MI	BG33	2E-05	<1	<1	Metal	Arsenic	C	2.8 - 7.6	4.62E+00	10/21	1.06E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.076 - 0.99	4.99E-01	5/34	2.84E-06	36.8	63.2	0.0		--	--	--	--		--	--

TABLE 5-6: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS) BY PLANNED REUSE (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals	
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?
EMI-1	MI	BG34	4E-05	<1	<1	Metal	Arsenic	C	1.9 - 12	6.65E+00	9/10	1.53E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)anthracene	C	0.057 - 4.7	3.97E+00	4/10	2.26E-06	36.8	63.2	0.0		--	--	--		--	--	
							Benzo(a)pyrene	C	0.066 - 3.9	2.29E+00	5/10	1.31E-05	36.8	63.2	0.0		--	--	--		--	--	
							Benzo(b)fluoranthene	C	0.11 - 4.2	3.34E+00	5/10	1.90E-06	36.8	63.2	0.0		--	--	--		--	--	
							Dibenz(a,h)anthracene	C	0.098 - 0.42	4.20E-01	2/10	1.46E-06	36.8	63.2	0.0		--	--	--		--	--	
							Indeno(1,2,3-cd)pyrene	C	0.31 - 2.3	2.30E+00	2/10	1.31E-06	36.8	63.2	0.0		--	--	--		--	--	
EMI-1	MI	BH33	9E-06	<1	<1	Metal	Arsenic	C	1.6 - 5.3	3.53E+00	6/11	8.14E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BH34	7E-06	<1	<1	Metal	Arsenic	C	1.7 - 3.2	3.20E+00	2/2	7.38E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BI32	2E-05	<1	<1	Metal	Arsenic	C	4.4 - 9.4	8.85E+00	4/4	2.04E-05	71.6	28.4	0.0		<1	--	--	--		11.1	No
EMI-1	MI	BI34	2E-04	<1	<1	Metal	Arsenic	C	2.1 - 99.5	8.18E+01	6/11	1.89E-04	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
							Lead	--	3.2 - 1340	8.36E+02	7/11	--	--	--	--		--	--	--		8.99	Yes	
						PAH	Benzo(a)pyrene	C	0.21 - 0.6	6.00E-01	2/10	3.42E-06	36.8	63.2	0.0		--	--	--		--	--	
EMI-1	MI	BJ32	2E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.05 - 0.26	2.60E-01	2/4	1.48E-06	36.8	63.2	0.0		--	--	--		--	--	
EMI-1	MI	BJ33	3E-05	<1	<1	Metal	Arsenic	C	4.1 - 12.1	1.09E+01	4/4	2.51E-05	71.6	28.4	0.0		<1	--	--	--		11.1	Yes
EMI-1	MI	BK32	1E-05	<1	<1	Metal	Arsenic	C	3.8 - 3.8	3.80E+00	1/1	8.76E-06	71.6	28.4	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.012 - 0.74	7.40E-01	3/4	4.21E-06	36.8	63.2	0.0		--	--	--		--	--	

Notes: All concentrations shown in milligrams per kilogram (mg/kg).

<1 Less than 1

-- Not applicable or chemical is not a COC for this endpoint

% Percent

bgs Below ground surface

C Cancer effect

COC Chemical of concern

EPC Exposure point concentration

HHRA Human health risk assessment

HI Hazard index

HPAL Hunters Point ambient level

IND Industrial (industrial exposure scenario)

MI Maritime industrial (industrial exposure scenario)

MU Mixed use (residential exposure scenario)

NC Noncancer effect

PAH Polynuclear aromatic hydrocarbon

Pest/PCB Pesticide/polychlorinated biphenyl

RD Redevelopment block

RME Reasonable maximum exposure

SVOC Semivolatile organic compound

VOC Volatile organic compound

TABLE 5-7: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals	
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?
31A	MU	AO25	2E-06	2E+00	<1	Metal Arsenic	C	3.4 - 3.4	3.40E+00	1/4	2.10E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
31A	MU	AP26	4E-06	2E+00	<1	Metal Arsenic	C	5.3 - 6.1	6.10E+00	2/2	3.76E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
31B/36	IND	AP27	2E-06	<1	<1	Metal Arsenic	C	2.4 - 5.7	3.32E+00	5/13	2.05E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
31B/36	IND	AQ26	3E-06	<1	<1	Metal Arsenic	C	2.6 - 5.2	5.20E+00	3/10	3.21E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
31B/36	IND	AQ28	2E-06	<1	<1	Metal Arsenic	C	2.5 - 3.1	3.10E+00	2/4	1.91E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
31B/36	IND	AR27	2E-06	2E+00	<1	Metal Arsenic	C	1.8 - 3.5	3.44E+00	5/6	2.12E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
31B/36	IND	AR28	6E-06	<1	<1	Metal Arsenic	C	0.44 - 32.3	9.89E+00	9/14	6.10E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
31B/36	IND	AS27	5E-06	2E+00	<1	Metal Arsenic	C	1.5 - 7.8	7.80E+00	2/2	4.81E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
31B/36	IND	AS28	4E-06	2E+00	<1	Metal Arsenic	C	2.2 - 6.5	5.11E+00	4/6	3.15E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
31B/36	IND	AS29	8E-06	<1	<1	Metal Arsenic	C	0.77 - 15.7	9.29E+00	14/23	5.73E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
31B/36	IND	AT26	5E-06	<1	<1	PAH Benzo(a)pyrene	C	1.2 - 1.2	1.20E+00	1/21	1.86E-06	35.8	64.2	0.0		--	--	--	--		--	--
31B/36	IND	AT27	3E-06	<1	<1	Metal Arsenic	C	2.5 - 7.3	7.30E+00	3/4	4.50E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
31B/36	IND	AT28	2E-06	<1	<1	Metal Arsenic	C	2.7 - 6.5	5.41E+00	5/6	3.34E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
31B/36	IND	AT28	2E-06	<1	<1	Metal Arsenic	C	1.7 - 4.2	2.95E+00	4/8	1.82E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
31B/36	IND	AT29	3E-05	2E+00	<1	Metal Arsenic	C	0.83 - 130	4.94E+01	11/14	3.04E-05	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
31B/36	IND	AU28	5E-06	<1	<1	Metal Arsenic	C	1.3 - 9.2	7.56E+00	6/6	4.66E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
31B/36	IND	AU29	7E-05	3E+00	2E+00	Metal Arsenic	C/N/C	4.4 - 105	1.05E+02	13/14	6.47E-05	70.7	29.3	0.0		1.60E+00	70.6	29.3	0.1		11.1	Yes
31B/36	IND	AU30	2E-06	<1	<1	Lead	--	8.2 - 980	9.80E+02	11/14	--	--	--	--		--	--	--	--		8.99	Yes
31B/36	IND	AU31	3E-06	<1	<1	Metal Arsenic	C	2.2 - 3.9	3.66E+00	4/4	2.26E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
31B/36	IND	AV29	2E-05	2E+00	<1	Metal Arsenic	C	1.5 - 7.2	3.92E+00	6/10	2.42E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
31B/36	IND	AV29	2E-05	2E+00	<1	Metal Arsenic	C	2.4 - 50.9	4.01E+01	18/23	2.47E-05	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
31B/36	IND	AV30	8E-06	2E+00	<1	Metal Arsenic	C	4.3 - 11	1.10E+01	4/7	6.78E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
40	IND	AW31	7E-06	<1	<1	Metal Arsenic	C	1.9 - 12.3	1.17E+01	4/4	7.21E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
40	IND	AX31	4E-06	<1	<1	Metal Arsenic	C	2.2 - 5.8	5.80E+00	2/2	3.58E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
40	IND	AX33	6E-06	<1	<1	Metal Arsenic	C	4.5 - 9.4	9.40E+00	3/3	5.80E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
40	IND	AY31	1E-06	<1	<1	Metal Arsenic	C	2 - 2	2.00E+00	1/3	1.23E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
40	IND	AY33	5E-06	<1	<1	Metal Arsenic	C	6.8 - 8	8.00E+00	2/8	4.93E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
40	IND	AZ32	4E-06	2E+00	<1	Metal Arsenic	C	7.2 - 7.2	7.20E+00	1/3	4.44E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
40	IND	AZ33	3E-06	2E+00	<1	Metal Arsenic	C	0.68 - 7.1	4.70E+00	8/8	2.90E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
40	IND	AZ34	3E-06	2E+00	<1	Metal Arsenic	C	2.4 - 7.4	5.10E+00	5/8	3.14E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
40	IND	BA33	1E-05	5E+00	3E+00	Metal Arsenic	C	0.7 - 21	1.39E+01	16/18	8.57E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
						Pest/PCB Aroclor-1254	NC	3.4 - 3.4	3.40E+00	1/18	9.20E-07	--	--	--		1.61E+00	34.1	65.9	0.0		--	--
						Aroclor-1260	NC	2.8 - 2.8	2.80E+00	1/18	7.58E-07	--	--	--		1.33E+00	34.1	65.9	0.0		--	--
41	IND	AX30	4E-06	<1	<1	Metal Arsenic	C	5.6 - 5.6	5.60E+00	1/1	3.45E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
41	IND	AZ29	3E-06	<1	<1	Metal Arsenic	C	1.7 - 4.6	4.60E+00	3/3	2.84E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
41	IND	BA29	3E-06	<1	<1	Metal Arsenic	C	0.64 - 12.9	4.38E+00	35/43	2.70E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
41	IND	BA30	3E-06	<1	<1	Metal Arsenic	C	0.77 - 11.6	3.47E+00	36/58	2.14E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
41	IND	BA31	3E-06	<1	<1	Metal Arsenic	C	3.6 - 4.1	4.10E+00	2/3	2.53E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
41	IND	BA32	2E-06	2E+00	<1	Metal Arsenic	C	3.1 - 3.1	3.10E+00	1/1	1.91E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
41	IND	BB29	2E-06	<1	<1	Metal Arsenic	C	0.38 - 7.9	3.29E+00	18/21	2.03E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
41	IND	BB30	5E-06	2E+00	<1	Metal Arsenic	C	1.1 - 8	3.64E+00	12/17	2.25E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
41	IND	BB31	3E-06	2E+00	<1	PAH Benzo(a)pyrene	C	0.014 - 4.8	6.59E-01	7/29	1.02E-06	35.8	64.2	0.0		--	--	--	--		--	--
41	IND	BB31	3E-06	2E+00	<1	Metal Arsenic	C	1.7 - 5.6	5.60E+00	3/3	3.45E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
43	IND	AN30	3E-06	2E+00	<1	Metal Arsenic	C	0.33 - 7.2	5.11E+00	7/8	3.15E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
43	IND	AO29	1E-06	<1	<1	Metal Arsenic	C	0.75 - 1.7	1.70E+00	2/3	1.05E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
43	IND	AO30	4E-06	2E+00	<1	Metal Arsenic	C	0.57 - 6.3	5.00E+00	14/22	3.08E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
43	IND	AO31	4E-06	<1	<1	Metal Arsenic	C	3 - 7.8	6.55E+00	9/9	4.04E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
43	IND	AP28	3E-06	<1	<1	Metal Arsenic	C	4.4 - 5.5	5.50E+00	3/4	3.39E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
43	IND	AP29	6E-05	3E+00	2E+00	Metal Arsenic	C/N/C	0.59 - 244	9.97E+01	12/19	6.15E-05	70.7	29.3	0.0		1.52E+00	70.6	29.3	0.1		11.1	Yes
43	IND	AP30	3E-06	2E+00	<1	Metal Arsenic	C	0.75 - 9.9	5.23E+00	9/10	3.22E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
43	IND	AP31	5E-06	<1	<1	Metal Arsenic	C	1.6 - 10.4	6.93E+00	8/9	4.27E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
43	IND	AQ29	3E-06	<1	<1	Metal Arsenic	C	1.2 - 4.9	4.90E+00	3/3	3.02E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
43	IND	AQ30	8E-06	6E+00	5E+00	Metal Arsenic	C	0.31 - 12	6.87E+00	9/9	4.24E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
						Pest/PCB Aroclor-1260	C/N/C	0.04 - 16	9.56E+00	12/19	2.59E-06	34.1	65.9	0.0		4.53E+00	34.1	65.9	0.0		--	--

TABLE 5-7: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals	
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?
43	IND	AQ32	4E-06	<1	<1	Metal	Arsenic	C	0.45 - 9.8	6.03E+00	7/7	3.72E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
43	IND	AR29	2E-06	<1	<1	Metal	Arsenic	C	1.9 - 5.4	3.57E+00	5/7	2.20E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
43	IND	AR30	5E-06	2E+00	<1	Metal	Arsenic	C	5.6 - 7.5	7.42E+00	4/4	4.57E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
43	IND	AR31	5E-06	2E+00	<1	Metal	Arsenic	C	1.8 - 13	7.07E+00	25/29	4.36E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
43	IND	AR32	8E-06	2E+00	<1	Metal	Arsenic	C	0.39 - 12.6	1.13E+01	43/49	6.98E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
43	IND	AR33	4E-06	<1	<1	Metal	Arsenic	C	0.99 - 8.9	5.77E+00	5/6	3.56E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
43	IND	AS30	7E-06	2E+00	<1	Metal	Arsenic	C	0.6 - 10.8	1.08E+01	3/6	6.66E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
							Iron	NC	15100 - 122000	1.15E+05	6/6	--	--	--	--		1.24E+00	100.0	0.0	0.0		58000	Yes
43	IND	AS31	5E-06	<1	<1	Metal	Arsenic	C	3.7 - 9.9	8.09E+00	7/7	4.99E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
43	IND	AS32	1E-05	2E+00	<1	Metal	Arsenic	C	0.81 - 27	2.30E+01	24/34	1.42E-05	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
43	IND	AS33	3E-06	<1	<1	Metal	Arsenic	C	1.8 - 15	4.30E+00	12/22	2.65E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
43	IND	AS34	5E-06	<1	<1	Metal	Arsenic	C	3.8 - 10.6	7.46E+00	4/6	4.60E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
43	IND	AT30	4E-06	2E+00	<1	Metal	Arsenic	C	0.35 - 9.6	6.59E+00	6/7	4.06E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
43	IND	AT31	4E-06	<1	<1	Metal	Arsenic	C	1.5 - 6.6	4.82E+00	10/12	2.97E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
43	IND	AT32	9E-05	6E+00	2E+00	Metal	Arsenic	C/NC	4.4 - 168	1.48E+02	9/10	9.15E-05	70.7	29.3	0.0		2.26E+00	70.6	29.3	0.1		11.1	Yes
							Mercury	NC	0.013 - 102	1.02E+02	9/10	--	--	--	--		1.10E+00	99.9	0.0	0.1		2.28	Yes
43	IND	AT33	6E-06	2E+00	<1	Metal	Arsenic	C	2.9 - 8.7	5.28E+00	6/10	3.25E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.084 - 2.4	1.27E+00	5/9	1.97E-06	35.8	64.2	0.0		--	--	--	--		--	--
43	IND	AU32	6E-06	3E+00	<1	Metal	Arsenic	C	0.97 - 12	7.97E+00	12/13	4.92E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
43	IND	AU33	1E-05	<1	<1	Metal	Arsenic	C	2.6 - 4.1	4.10E+00	4/5	2.53E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)anthracene	C	0.086 - 6.5	6.50E+00	8/16	1.01E-06	35.8	64.2	0.0		--	--	--	--		--	--
							Benzo(a)pyrene	C	0.061 - 3.5	3.50E+00	8/16	5.42E-06	35.8	64.2	0.0		--	--	--	--		--	--
43	IND	AU34	8E-06	<1	<1	Metal	Arsenic	C	4.7 - 11.1	1.11E+01	3/10	6.84E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
43	IND	AV32	1E-05	2E+00	<1	Metal	Arsenic	C	3.3 - 14	7.41E+00	13/16	4.57E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.19 - 2.1	2.10E+00	3/21	3.25E-06	35.8	64.2	0.0		--	--	--	--		--	--
						VOC	Benzene	C	0.00038 - 19	1.90E+01	7/16	2.03E-06	4.3	0.0	95.7		<1	--	--	--		--	--
43	IND	AV33	6E-06	2E+00	<1	Metal	Arsenic	C	2.8 - 8	6.05E+00	14/23	3.73E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
						PAH	Dibenz(a,h)anthracene	C	1.1 - 1.1	1.10E+00	1/54	1.04E-06	35.8	64.2	0.0		--	--	--	--		--	--
43	IND	AV34	5E-06	2E+00	<1	Metal	Arsenic	C	1.1 - 11.2	6.89E+00	8/12	4.25E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
43	IND	AW33	1E-05	2E+00	<1	Metal	Arsenic	C	4.8 - 20	1.59E+01	6/6	9.83E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
43	IND	AW34	6E-06	2E+00	<1	Metal	Arsenic	C	1.4 - 11.2	5.33E+00	12/22	3.29E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.099 - 2.2	8.88E-01	7/30	1.38E-06	35.8	64.2	0.0		--	--	--	--		--	--
43	IND	AX34	2E-06	2E+00	<1	Metal	Arsenic	C	2.2 - 4	4.00E+00	3/3	2.47E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
44	IND	AL32	6E-06	3E+00	2E+00	Metal	Arsenic	C	2.4 - 9.7	6.67E+00	4/6	4.11E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
						Pest/PCB	Aroclor-1260	NC	0.36 - 3.6	3.60E+00	2/6	9.75E-07	--	--	--		1.71E+00	34.1	65.9	0.0		--	--
44	IND	AM31	2E-06	<1	<1	Metal	Arsenic	C	1.4 - 3.9	3.90E+00	2/2	2.40E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
44	IND	AM32	2E-05	2E+01	2E+01	Metal	Arsenic	C	1.4 - 8.7	6.77E+00	14/14	4.18E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
							Lead	--	1.7 - 6570	5.13E+03	14/14	--	--	--	--		--	--	--	--		8.99	Yes
						Pest/PCB	Aroclor-1254	C/NC	0.57 - 33	2.69E+01	4/14	7.27E-06	34.1	65.9	0.0		1.27E+01	34.1	65.9	0.0		--	--
							Aroclor-1260	C/NC	0.086 - 10	9.48E+00	6/14	2.57E-06	34.1	65.9	0.0		4.49E+00	34.1	65.9	0.0		--	--
44	IND	AM33	8E-06	5E+00	2E+00	Metal	Arsenic	C	2.2 - 14.1	8.03E+00	10/10	4.95E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
							Vanadium	NC	6.2 - 645	4.36E+02	10/10	--	--	--	--		1.41E+00	100.0	0.0	0.0		117.17	No
						Pest/PCB	Aroclor-1260	C/NC	0.1 - 3.9	3.90E+00	7/10	1.06E-06	34.1	65.9	0.0		1.85E+00	34.1	65.9	0.0		--	--
44	IND	AM34	8E-06	5E+00	3E+00	Metal	Arsenic	C	0.64 - 13	6.99E+00	13/16	4.31E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.092 - 0.75	7.50E-01	2/16	1.16E-06	35.8	64.2	0.0		--	--	--	--		--	--
						Pest/PCB	Aroclor-1260	C/NC	0.39 - 5.3	5.30E+00	3/16	1.43E-06	34.1	65.9	0.0		2.51E+00	34.1	65.9	0.0		--	--
44	IND	AM35	2E-05	1E+01	6E+00	Metal	Arsenic	C	3.5 - 32	1.73E+01	6/15	1.07E-05	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.051 - 3.6	3.60E+00	11/17	5.57E-06	35.8	64.2	0.0		--	--	--	--		--	--
						Pest/PCB	Aroclor-1248	C/NC	7.1 - 7.1	7.10E+00	1/15	1.92E-06	34.1	65.9	0.0		3.36E+00	34.1	65.9	0.0		--	--
						VOC	1,2,4-Trimethylbenzene	NC	440 - 440	4.40E+02	1/1	--	--	--	--		2.60E+00	1.1	0.0	98.9		--	--
							1,3,5-Trimethylbenzene	NC	200 - 200	2.00E+02	1/1	--	--	--	--		2.88E+00	0.4	0.0	99.6		--	--
44	IND	AN31	5E-06	2E+00	<1	Metal	Arsenic	C	2.5 - 8.4	8.40E+00	4/4	5.18E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
44	IND	AN32	4E-06	<1	<1	Metal	Arsenic	C	2.9 - 6.9	6.90E+00	3/3	4.25E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
44	IND	AN33	6E-06	2E+00	<1	Metal	Arsenic	C	2 - 11.1	7.14E+00	10/11	4.40E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
44	IND	AO35	2E-06	<1	<1	Metal	Arsenic	C	3.3 - 3.7	3.70E+00	2/4	2.28E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
44	IND	AQ36	2E-06	<1	<1	Metal	Arsenic	C	2.4 - 2.4	2.40E+00	1/1	1.48E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
44	IND	AP32	7E-06	<1	<1	Metal	Arsenic	C	3.9 - 11.2	1.06E+01	4/4	6.53E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
44	IND	AP33	3E-06	<1	<1	Metal	Arsenic	C	4.7 - 5	5.00E+00	2/3	3.08E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No

TABLE 5-7: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals	
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?
44	IND	AP34	3E-06	<1	<1	Metal	Arsenic	C	2.8 - 6.4	4.46E+00	5/8	2.75E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
44	IND	AP37	5E-06	3E+00	2E+00	Metal	Arsenic	C	3.8 - 8.9	6.12E+00	6/12	3.77E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
						Pest/PCB	Aroclor-1260	NC	0.019 - 4.3	3.31E+00	4/12	8.97E-07	--	--	--		1.57E+00	34.1	65.9	0.0		--	--
44	IND	AQ33	2E-06	<1	<1	Metal	Arsenic	C	2.5 - 3.6	3.60E+00	2/2	2.22E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
44	IND	AQ35	8E-06	2E+01	1E+01	Metal	Arsenic	C	3.5 - 9.1	6.18E+00	5/9	3.81E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
						VOC	1,2,4-Trimethylbenzene	NC	1400 - 1400	1.40E+03	1/1	--	--	--	--		8.29E+00	1.1	0.0	98.9		--	--
							1,3,5-Trimethylbenzene	NC	290 - 290	2.90E+02	1/1	--	--	--	--		4.17E+00	0.4	0.0	99.6		--	--
							Naphthalene	C/NC	0.17 - 210	2.10E+02	2/10	2.79E-06	41.6	0.0	58.4		1.14E+00	3.0	0.0	97.0		--	--
44	IND	AQ36	7E-06	4E+00	2E+00	Metal	Arsenic	C	2.6 - 17.6	9.36E+00	11/16	5.77E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
							Lead	--	7.6 - 1150	1.15E+03	14/16	--	--	--	--		--	--	--	--		8.99	Yes
							Vanadium	NC	22.1 - 3570	6.77E+02	16/16	--	--	--	--		2.19E+00	100.0	0.0	0.0		117.17	Yes
44	IND	AR34	4E-06	2E+00	<1	Metal	Arsenic	C	0.42 - 6.1	6.10E+00	3/4	3.76E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
44	IND	AR35	3E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.23 - 1.2	1.20E+00	2/2	1.86E-06	35.8	64.2	0.0		--	--	--		--	--	--
44	IND	AR36	1E-05	3E+00	<1	Metal	Arsenic	C	2 - 42.9	1.41E+01	7/11	8.69E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
44	IND	AR37	3E-06	<1	<1	Metal	Arsenic	C	2.7 - 3.5	3.46E+00	4/4	2.14E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
44	IND	AS36	2E-06	<1	<1	Metal	Arsenic	C	3.1 - 3.5	3.50E+00	3/3	2.16E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
44	IND	AU35	2E-06	2E+00	<1	Metal	Arsenic	C	1.4 - 3.5	3.50E+00	3/4	2.16E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
44	IND	AU36	1E-06	<1	<1	Metal	Arsenic	C	2.2 - 2.2	2.20E+00	1/1	1.36E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
44	IND	AV36	8E-06	<1	<1	Metal	Arsenic	C	2.8 - 15	1.22E+01	13/13	7.53E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
44	IND	AW35	5E-06	2E+00	<1	Metal	Arsenic	C	4.3 - 7.5	7.50E+00	2/4	4.62E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
44	IND	AW36	6E-06	<1	<1	Metal	Arsenic	C	2.1 - 13	7.14E+00	12/12	4.40E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
44	IND	AX35	3E-06	<1	<1	Metal	Arsenic	C	1.9 - 4.5	4.50E+00	4/4	2.77E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
44	IND	AY35	7E-06	2E+00	<1	Metal	Arsenic	C	4.3 - 11.9	1.19E+01	3/3	7.34E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
45	RD	AH26	1E-06	2E+00	<1	Metal	Arsenic	C	1.6 - 2	2.00E+00	2/5	1.23E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
45	RD	AH27	1E-05	<1	<1	Metal	Arsenic	C	0.72 - 16.5	1.65E+01	2/3	1.02E-05	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
45	RD	AI25	4E-06	2E+00	<1	Metal	Arsenic	C	6.4 - 6.4	6.40E+00	1/2	3.95E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
45	RD	AI26	2E-06	2E+00	<1	Metal	Arsenic	C	0.91 - 4.7	3.56E+00	6/14	2.20E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
45	RD	AI27	2E-05	2E+00	<1	Metal	Arsenic	C	2.4 - 21.8	2.18E+01	4/8	1.34E-05	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.76 - 0.76	7.60E-01	1/8	1.18E-06	35.8	64.2	0.0		--	--	--		--	--	--
45	RD	AI28	5E-06	<1	<1	Metal	Arsenic	C	0.81 - 8	6.48E+00	5/5	3.99E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
						PAH	Benzo(a)pyrene	C	0.67 - 0.67	6.70E-01	1/5	1.04E-06	35.8	64.2	0.0		--	--	--		--	--	--
45	RD	AJ25	7E-06	2E+00	<1	Metal	Arsenic	C	3.2 - 11.6	1.07E+01	4/4	6.60E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
45	RD	AJ26	3E-06	2E+00	<1	Metal	Arsenic	C	1.9 - 5.6	5.60E+00	3/4	3.45E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
45	RD	AJ27	2E-06	2E+00	<1	Metal	Arsenic	C	3 - 3	3.00E+00	1/1	1.85E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
45	RD	AJ28	6E-06	2E+00	<1	Metal	Arsenic	C	4.2 - 17.9	7.47E+00	11/19	4.60E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
45	RD	AK25	5E-06	2E+00	<1	Metal	Arsenic	C	1.3 - 7.4	7.40E+00	3/6	4.56E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
45	RD	AK26	3E-06	2E+00	<1	Metal	Arsenic	C	0.88 - 12	4.52E+00	14/19	2.79E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
45	RD	AK27	2E-05	2E+00	<1	Metal	Arsenic	C	2.9 - 49.9	3.64E+01	7/15	2.24E-05	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
45	RD	AK28	1E-05	2E+00	<1	Metal	Arsenic	C	1.2 - 15.2	1.52E+01	8/13	9.37E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
							Lead	--	3.3 - 4850	1.04E+03	13/13	--	--	--	--		--	--	--	--		8.99	Yes
45	RD	AL25	4E-06	2E+00	<1	Metal	Arsenic	C	2 - 4.5	4.50E+00	2/4	2.77E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
45	RD	AL26	6E-06	<1	<1	Metal	Arsenic	C	0.73 - 9.6	9.60E+00	6/13	5.92E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
45	RD	AL27	5E-06	3E+00	2E+00	Metal	Arsenic	C	1.3 - 10.9	6.58E+00	7/11	4.06E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
						Pest/PCB	Aroclor-1260	NC	3.3 - 3.3	3.30E+00	1/11	--	--	--	--		1.56E+00	34.1	65.9	0.0		--	--
45	RD	AL28	5E-06	3E+00	<1	Metal	Arsenic	C	5.7 - 7.8	7.80E+00	3/3	4.81E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
							Lead	--	5.9 - 1900	1.90E+03	3/3	--	--	--	--		--	--	--	--		8.99	Yes
45	RD	AL30	5E-06	<1	<1	Metal	Arsenic	C	3.1 - 11.3	8.46E+00	4/5	5.22E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
45	RD	AL31	5E-06	2E+00	<1	Metal	Arsenic	C	1.2 - 10.1	7.84E+00	11/12	4.84E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
45	RD	AM26	2E-06	2E+00	<1	Metal	Arsenic	C	1.1 - 3.4	3.40E+00	2/5	2.10E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
45	RD	AM27	6E-06	2E+00	<1	Metal	Arsenic	C	5.7 - 9.7	9.70E+00	2/3	5.98E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
45	RD	AM28	1E-05	2E+00	<1	Metal	Arsenic	C	1.4 - 16.7	1.55E+01	4/4	9.57E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
45	RD	AM29	1E-05	2E+00	<1	Metal	Arsenic	C	5 - 16.4	1.64E+01	3/4	1.01E-05	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
45	RD	AM30	2E-06	<1	<1	Metal	Arsenic	C	1.4 - 4.4	3.41E+00	5/7	2.10E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
45	RD	AN25	1E-06	2E+00	<1	Metal	Arsenic	C	2.1 - 2.1	2.10E+00	1/4	1.29E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
45	RD	AN26	4E-06	2E+00	<1	Metal	Arsenic	C	3.9 - 5.7	5.70E+00	4/5	3.51E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
45	RD	AN27	3E-06	<1	<1	Metal	Arsenic	C	0.68 - 5.5	5.50E+00	6/8	3.39E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
45	RD	AN28	6E-06	2E+00	<1	Metal	Arsenic	C	1.6 - 12.6	9.66E+00	4/5	5.96E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
45	RD	AN29	2E-06	<1	<1	Metal	Arsenic	C	1.2 - 5.4	3.79E+00	8/8	2.34E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No

TABLE 5-7: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals	
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?
EMI-1	MI	BA34	5E-06	<1	<1	Metal Arsenic	C	0.79 - 12	7.10E+00	7/9	4.38E-06	70.7	29.3	0.0	<1	--	--	--	11.1	Yes		
EMI-1	MI	BA35	3E-06	3E+00	<1	Metal Arsenic	C	0.57 - 3.9	3.90E+00	5/5	2.40E-06	70.7	29.3	0.0	<1	--	--	--	11.1	No		
						Manganese	NC	570 - 7730	7.73E+03	5/5	--	--	--	--	1.12E+00	92.7	0.0	7.3	1431	Yes		
EMI-1	MI	BB32	4E-06	2E+00	<1	Metal Arsenic	C	3.8 - 3.8	3.80E+00	1/9	2.34E-06	70.7	29.3	0.0	<1	--	--	--	11.1	No		
EMI-1	MI	BB33	1E-05	5E+00	3E+00	Metal Arsenic	C	2.7 - 13	1.30E+01	10/15	8.02E-06	70.7	29.3	0.0	<1	--	--	--	11.1	No		
						Pest/PCB Aroclor-1254	C/NC	1.9 - 6.9	6.90E+00	2/25	1.87E-06	34.1	65.9	0.0	3.27E+00	34.1	65.9	0.0	--	--		
EMI-1	MI	BB34	5E-06	2E+00	<1	Metal Arsenic	C	3.2 - 14.5	7.20E+00	11/24	4.44E-06	70.7	29.3	0.0	<1	--	--	--	11.1	Yes		
EMI-1	MI	BB35	4E-06	2E+00	<1	Metal Arsenic	C	0.81 - 6.6	6.02E+00	4/4	3.71E-06	70.7	29.3	0.0	<1	--	--	--	11.1	No		
EMI-1	MI	BC32	2E-06	2E+00	<1	Metal Arsenic	C	0.53 - 3.2	3.20E+00	2/2	1.97E-06	70.7	29.3	0.0	<1	--	--	--	11.1	No		
EMI-1	MI	BC33	7E-06	2E+00	<1	Metal Arsenic	C	0.59 - 14.5	9.86E+00	10/12	6.08E-06	70.7	29.3	0.0	<1	--	--	--	11.1	Yes		
EMI-1	MI	BC34	5E-06	2E+00	<1	Metal Arsenic	C	1.4 - 7.8	7.80E+00	2/4	4.81E-06	70.7	29.3	0.0	<1	--	--	--	11.1	No		
EMI-1	MI	BC35	2E-06	2E+00	<1	Metal Arsenic	C	3.9 - 3.9	3.90E+00	1/2	2.40E-06	70.7	29.3	0.0	<1	--	--	--	11.1	No		
EMI-1	MI	BD32	3E-05	2E+00	<1	Metal Arsenic	C	3.5 - 48.6	4.86E+01	6/10	3.00E-05	70.7	29.3	0.0	<1	--	--	--	11.1	Yes		
EMI-1	MI	BD33	8E-06	2E+00	<1	Metal Arsenic	C	0.85 - 62	1.15E+01	25/26	7.07E-06	70.7	29.3	0.0	<1	--	--	--	11.1	Yes		
EMI-1	MI	BD34	7E-06	3E+00	2E+00	Metal Arsenic	C	0.67 - 14.5	9.23E+00	15/20	5.69E-06	70.7	29.3	0.0	<1	--	--	--	11.1	No		
						Pest/PCB Aroclor-1254	NC	0.087 - 3.3	3.30E+00	3/17	8.93E-07	--	--	--	1.56E+00	34.1	65.9	0.0	--	--		
EMI-1	MI	BE30	3E-06	<1	<1	Metal Arsenic	C	3.6 - 5.1	4.50E+00	4/7	2.78E-06	70.7	29.3	0.0	<1	--	--	--	11.1	No		
EMI-1	MI	BE31	7E-06	2E+00	<1	Metal Arsenic	C	1.2 - 12	1.20E+01	4/5	7.40E-06	70.7	29.3	0.0	<1	--	--	--	11.1	Yes		
EMI-1	MI	BE32	1E-05	<1	<1	Metal Arsenic	C	0.87 - 9.2	6.57E+00	8/10	4.05E-06	70.7	29.3	0.0	<1	--	--	--	11.1	No		
						PAH Benzo(a)pyrene	C	0.096 - 5.3	4.18E+00	6/12	6.46E-06	35.8	64.2	0.0	--	--	--	--	--	--		
EMI-1	MI	BE33	5E-06	<1	<1	Metal Arsenic	C	1.6 - 12	6.25E+00	44/45	3.85E-06	70.7	29.3	0.0	<1	--	--	--	11.1	Yes		
EMI-1	MI	BE34	1E-05	2E+01	2E+01	Metal Arsenic	C	2.5 - 11.8	4.91E+00	17/26	3.03E-06	70.7	29.3	0.0	<1	--	--	--	11.1	Yes		
						Pest/PCB Aroclor-1254	C/NC	30 - 38	3.80E+01	2/25	1.03E-05	34.1	65.9	0.0	1.80E+01	34.1	65.9	0.0	--	--		
EMI-1	MI	BF31	4E-05	4E+00	<1	Metal Arsenic	C	0.76 - 58.1	5.81E+01	6/6	3.58E-05	70.7	29.3	0.0	<1	--	--	--	11.1	Yes		
						Copper	NC	59 - 15000	1.50E+04	6/6	--	--	--	--	1.31E+00	100.0	0.0	0.0	124.31	Yes		
						Lead	--	16 - 4300	4.30E+03	6/6	--	--	--	--	--	--	--	--	8.99	Yes		
EMI-1	MI	BF32	6E-06	<1	<1	Metal Arsenic	C	5.5 - 9.7	9.70E+00	2/3	5.98E-06	70.7	29.3	0.0	<1	--	--	--	11.1	No		
EMI-1	MI	BF33	4E-06	<1	<1	Metal Arsenic	C	4.1 - 6.2	5.76E+00	5/5	3.55E-06	70.7	29.3	0.0	<1	--	--	--	11.1	No		
EMI-1	MI	BF34	4E-06	<1	<1	Metal Arsenic	C	2.4 - 7.5	5.61E+00	10/10	3.46E-06	70.7	29.3	0.0	<1	--	--	--	11.1	No		
EMI-1	MI	BG32	2E-06	<1	<1	PAH Benzo(a)pyrene	C	0.27 - 0.7	7.00E-01	2/9	1.08E-06	35.8	64.2	0.0	--	--	--	--	--	--		
EMI-1	MI	BG33	4E-06	<1	<1	Metal Arsenic	C	2.8 - 7.6	4.62E+00	10/21	2.85E-06	70.7	29.3	0.0	<1	--	--	--	11.1	No		
EMI-1	MI	BG34	1E-05	<1	<1	Metal Arsenic	C	1.9 - 12	6.65E+00	9/10	4.10E-06	70.7	29.3	0.0	<1	--	--	--	11.1	Yes		
						PAH Benzo(a)pyrene	C	0.066 - 3.9	2.29E+00	5/10	3.55E-06	35.8	64.2	0.0	--	--	--	--	--	--		
EMI-1	MI	BH33	2E-06	<1	<1	Metal Arsenic	C	1.6 - 5.3	3.53E+00	6/11	2.18E-06	70.7	29.3	0.0	<1	--	--	--	11.1	No		
EMI-1	MI	BH34	2E-06	<1	<1	Metal Arsenic	C	1.7 - 3.2	3.20E+00	2/2	1.97E-06	70.7	29.3	0.0	<1	--	--	--	11.1	No		
EMI-1	MI	BI32	5E-06	<1	<1	Metal Arsenic	C	4.4 - 9.4	8.85E+00	4/4	5.46E-06	70.7	29.3	0.0	<1	--	--	--	11.1	No		
EMI-1	MI	BI34	5E-05	2E+00	<1	Metal Arsenic	C/NC	2.1 - 99.5	8.18E+01	6/11	5.05E-05	70.7	29.3	0.0	1.25E+00	70.6	29.3	0.1	11.1	Yes		
						Lead	--	3.2 - 1340	8.36E+02	7/11	--	--	--	--	--	--	--	--	8.99	Yes		
EMI-1	MI	BJ33	7E-06	2E+00	<1	Metal Arsenic	C	4.1 - 12.1	1.09E+01	4/4	6.70E-06	70.7	29.3	0.0	<1	--	--	--	11.1	Yes		
EMI-1	MI	BK32	4E-06	<1	<1	Metal Arsenic	C	3.8 - 3.8	3.80E+00	1/1	2.34E-06	70.7	29.3	0.0	<1	--	--	--	11.1	No		
						PAH Benzo(a)pyrene	C	0.012 - 0.74	7.40E-01	3/4	1.15E-06	35.8	64.2	0.0	--	--	--	--	--	--		
EOS-1	OS	AL35	1E-05	3E+00	<1	Metal Arsenic	C	6.9 - 12	1.20E+01	2/3	7.40E-06	70.7	29.3	0.0	<1	--	--	--	11.1	Yes		
						Vanadium	NC	73 - 390	3.90E+02	3/3	--	--	--	--	1.26E+00	100.0	0.0	0.0	117.17	No		
						PAH Benzo(a)pyrene	C	0.17 - 1.1	1.10E+00	2/3	1.70E-06	35.8	64.2	0.0	--	--	--	--	--	--		
EOS-1	OS	AL36	3E-05	8E+00	3E+00	Metal Antimony	NC	19 - 209	2.09E+02	2/7	--	--	--	--	1.69E+00	100.0	0.0	0.0	9.05	Yes		
						Arsenic	C	2.9 - 31	3.10E+01	2/7	1.91E-05	70.7	29.3	0.0	<1	--	--	--	11.1	No		
						Iron	NC	6300 - 140000	1.40E+05	7/7	--	--	--	--	1.51E+00	100.0	0.0	0.0	58000	No		
						PAH Benzo(a)pyrene	C	0.18 - 2.5	2.50E+00	4/7	3.87E-06	35.8	64.2	0.0	--	--	--	--	--	--		
						Pest/PCB Aroclor-1260	C/NC	0.11 - 5.5	5.50E+00	6/7	1.49E-06	34.1	65.9	0.0	2.61E+00	34.1	65.9	0.0	--	--		
EOS-1	OS	AL37	6E-06	2E+00	<1	Metal Arsenic	C	5.1 - 8.6	8.60E+00	2/2	5.30E-06	70.7	29.3	0.0	<1	--	--	--	11.1	No		
EOS-1	OS	AM36	2E-05	2E+01	1E+01	Metal Arsenic	C	3.1 - 26	1.40E+01	9/14	8.63E-06	70.7	29.3	0.0	<1	--	--	--	11.1	Yes		
						Lead	--	9.3 - 883	8.83E+02	13/14	--	--	--	--	--	--	--	--	8.99	Yes		
						Vanadium	NC	16 - 720	3.99E+02	14/14	--	--	--	--	1.29E+00	100.0	0.0	0.0	117.17	No		
						PAH Benzo(a)pyrene	C	0.045 - 1.8	1.80E+00	5/14	2.79E-06	35.8	64.2	0.0	--	--	--	--	--	--		
						Pest/PCB Aroclor-1260	C/NC	0.022 - 110	2.52E+01	7/14	6.83E-06	34.1	65.9	0.0	1.20E+01	34.1	65.9	0.0	--	--		

TABLE 5-7: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals			
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?		
EOS-1	OS	AM37	3E-05	1E+01	8E+00	Metal	Antimony	NC	14.7 - 343	3.43E+02	8/14	--	--	--	--	2.77E+00	100.0	0.0	0.0	--	9.05	Yes			
							Arsenic	C	2.8 - 20.3	1.01E+01	11/14	6.26E-06	70.7	29.3	0.0	--	<1	--	--	--	--	11.1	No		
							Lead	--	160 - 10600	2.91E+03	13/14	--	--	--	--	--	--	--	--	--	8.99	Yes			
						PAH	Benzo(a)anthracene	C	0.15 - 20	2.00E+01	7/14	3.10E-06	35.8	64.2	0.0	--	--	--	--	--	--	--	--	--	--
							Benzo(a)pyrene	C	0.1 - 6.6	6.60E+00	9/14	1.02E-05	35.8	64.2	0.0	--	--	--	--	--	--	--	--	--	--
							Benzo(b)fluoranthene	C	0.15 - 12	1.20E+01	9/14	1.86E-06	35.8	64.2	0.0	--	--	--	--	--	--	--	--	--	--
							Dibenz(a,h)anthracene	C	0.041 - 1.5	1.50E+00	4/14	1.41E-06	35.8	64.2	0.0	--	--	--	--	--	--	--	--	--	--
						Pest/PCB	Aroclor-1254	NC	0.15 - 2.2	2.20E+00	4/14	--	--	--	--	1.04E+00	34.1	65.9	0.0	--	--	--	--	--	--
Aroclor-1260	C/NC	0.074 - 15	1.50E+01	12/14	4.06E-06		34.1	65.9	0.0	7.11E+00	34.1	65.9	0.0	--	--	--	--	--	--						
EOS-1	OS	AM38	1E-05	3E+00	<1	Metal	Arsenic	C	2.1 - 19.2	1.92E+01	4/6	1.18E-05	70.7	29.3	0.0	<1	--	--	--	--	11.1	Yes			
							Lead	--	19.2 - 1180	9.27E+02	6/6	--	--	--	--	--	--	--	--	--	8.99	Yes			
EOS-1	OS	AN36	7E-06	2E+00	<1	Metal	Arsenic	C	4.1 - 7.9	7.90E+00	3/4	4.87E-06	70.7	29.3	0.0	<1	--	--	--	--	11.1	No			
						PAH	Benzo(a)pyrene	C	1.3 - 1.3	1.30E+00	1/3	2.01E-06	35.8	64.2	0.0	--	--	--	--	--	--	--			
EOS-1	OS	AN37	1E-04	3E+02	2E+02	Metal	Antimony	NC	11.8 - 1930	1.93E+03	5/6	--	--	--	--	1.56E+01	100.0	0.0	0.0	--	9.05	Yes			
							Arsenic	C	2.7 - 13.7	9.53E+00	6/6	5.88E-06	70.7	29.3	0.0	<1	--	--	--	--	11.1	Yes			
							Copper	NC	29.9 - 198000	1.98E+05	6/6	--	--	--	--	1.73E+01	100.0	0.0	0.0	--	124.31	No			
							Iron	NC	6220 - 194000	1.94E+05	6/6	--	--	--	--	2.09E+00	100.0	0.0	0.0	--	58000	Yes			
							Lead	--	139 - 8910	5.71E+03	6/6	--	--	--	--	--	--	--	--	8.99	Yes				
							Nickel	NC	109 - 10300	1.03E+04	6/6	--	--	--	--	1.77E+00	93.8	0.0	6.2	--	*	No			
							Aroclor-1260	C/NC	0.3 - 490	4.90E+02	6/8	1.33E-04	34.1	65.9	0.0	2.32E+02	34.1	65.9	0.0	--	--	--	--		
						Metal	Arsenic	C	2 - 29.5	2.58E+01	13/14	1.59E-05	70.7	29.3	0.0	<1	--	--	--	--	11.1	No			
	Copper	NC	224 - 85600	2.10E+04	14/14	--	--	--	--	1.83E+00	100.0	0.0	0.0	--	124.31	No									
	Iron	NC	1740 - 198000	1.76E+05	14/14	--	--	--	--	1.90E+00	100.0	0.0	0.0	--	58000	No									
	Lead	--	211 - 4130	2.32E+03	14/14	--	--	--	--	--	--	--	--	--	8.99	Yes									
EOS-1	OS	AN38	4E-05	1E+01	6E+00	PAH	Benzo(a)anthracene	C	0.079 - 36	1.84E+01	8/14	2.85E-06	35.8	64.2	0.0	--	--	--	--	--	--	--			
							Benzo(a)pyrene	C	0.064 - 14	7.07E+00	9/14	1.09E-05	35.8	64.2	0.0	--	--	--	--	--	--	--	--		
							Benzo(b)fluoranthene	C	0.13 - 21	8.42E+00	11/14	1.30E-06	35.8	64.2	0.0	--	--	--	--	--	--	--			
							Benzo(k)fluoranthene	C	0.045 - 20	9.71E+00	9/14	1.50E-06	35.8	64.2	0.0	--	--	--	--	--	--	--			
							Dibenz(a,h)anthracene	C	0.049 - 1.7	1.70E+00	6/14	1.60E-06	35.8	64.2	0.0	--	--	--	--	--	--	--			
							Pest/PCB	Aldrin	C	0.65 - 0.65	6.50E-01	1/14	1.21E-06	42.0	58.0	0.0	<1	--	--	--	--	--	--		
							Aroclor-1260	C/NC	0.44 - 4.8	4.80E+00	7/8	1.30E-06	34.1	65.9	0.0	2.27E+00	34.1	65.9	0.0	--	--	--			
						Metal	Arsenic	C	8.6 - 9.3	9.30E+00	2/2	5.73E-06	70.7	29.3	0.0	<1	--	--	--	--	11.1	No			
	Lead	--	275 - 875	8.75E+02	2/2	--	--	--	--	--	--	--	--	--	8.99	Yes									
EOS-1	OS	AO37	7E-06	2E+00	<1	Metal	Arsenic	C	5.2 - 12	1.20E+01	3/3	7.40E-06	70.7	29.3	0.0	<1	--	--	--	11.1	Yes				
EOS-1	OS	AO39	9E-06	7E+00	3E+00	Metal	Antimony	NC	175 - 364	3.64E+02	3/4	--	--	--	--	2.94E+00	100.0	0.0	0.0	--	9.05	Yes			
							Arsenic	C	9.3 - 13.3	1.33E+01	2/5	8.20E-06	70.7	29.3	0.0	<1	--	--	--	--	11.1	Yes			
							Iron	NC	40100 - 178000	1.48E+05	5/5	--	--	--	--	1.59E+00	100.0	0.0	0.0	--	58000	Yes			
							Lead	--	12.6 - 17600	1.27E+04	5/5	--	--	--	--	--	--	--	--	8.99	Yes				
EOS-1	OS	AP38	1E-05	2E+01	1E+01	Metal	Antimony	NC	13.7 - 1510	1.51E+03	2/2	--	--	--	--	1.22E+01	100.0	0.0	0.0	--	9.05	Yes			
							Arsenic	C	6 - 15.9	1.59E+01	2/2	9.80E-06	70.7	29.3	0.0	<1	--	--	--	--	11.1	Yes			
							Iron	NC	25500 - 200000	2.00E+05	2/2	--	--	--	--	2.15E+00	100.0	0.0	0.0	--	58000	Yes			
							Lead	--	92.2 - 19700	1.97E+04	2/2	--	--	--	--	--	--	--	--	8.99	Yes				
EOS-1	OS	AQ39	8E-06	<1	<1	Metal	Arsenic	C	13 - 13	1.30E+01	1/7	8.02E-06	70.7	29.3	0.0	<1	--	--	--	--	11.1	Yes			
							Lead	--	9.3 - 2300	2.30E+03	5/7	--	--	--	--	--	--	--	--	--	8.99	Yes			
EOS-1	OS	AQ40	6E-06	2E+00	<1	Metal	Arsenic	C	6.5 - 7.2	7.20E+00	4/4	4.44E-06	70.7	29.3	0.0	<1	--	--	--	--	11.1	No			
EOS-1	OS	AR39	3E-06	<1	<1	Metal	Arsenic	C	2.7 - 3.5	3.50E+00	3/17	2.16E-06	70.7	29.3	0.0	<1	--	--	--	--	11.1	No			
EOS-1	OS	AR40	2E-05	7E+00	6E+00	Metal	Arsenic	C	2 - 85.3	1.80E+01	15/17	1.11E-05	70.7	29.3	0.0	<1	--	--	--	--	11.1	Yes			
							Lead	--	7 - 2300	2.30E+03	15/17	--	--	--	--	--	--	--	--	8.99	Yes				
						PAH	Benzo(a)pyrene	C	0.082 - 3.1	6.89E-01	5/15	1.07E-06	35.8	64.2	0.0	--	--	--	--	--	--	--	--		
						Pest/PCB	Aroclor-1260	C/NC	0.037 - 45	1.22E+01	13/17	3.31E-06	34.1	65.9	0.0	5.79E+00	34.1	65.9	0.0	--	--	--	--		
						Metal	Arsenic	C	5.4 - 56.1	3.45E+01	9/9	2.13E-05	70.7	29.3	0.0	<1	--	--	--	--	11.1	Yes			
	Lead	--	18 - 1440	1.44E+03	2/9	--	--	--	--	--	--	--	--	8.99	No										
EOS-1	OS	AT38	1E-05	3E+00	<1	Metal	Benzo(a)pyrene	C	0.11 - 2	9.87E-01	5/9	1.53E-06	35.8	64.2	0.0	--	--	--	--	--	--	--			
							Antimony	NC	160 - 160	1.60E+02	1/13	--	--	--	--	1.29E+00	100.0	0.0	0.0	--	9.05	Yes			
						Arsenic	C	6.1 - 12	1.02E+01	13/13	6.29E-06	70.7	29.3	0.0	<1	--	--	--	--	11.1	Yes				
EOS-1	OS	AT39	8E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.084 - 5.1	1.25E+00	6/13	1.94E-06	35.8	64.2	0.0	--	--	--	--	--	--				
						Metal	Arsenic	C	11 - 12	1.20E+01	2/2	7.40E-06	70.7	29.3	0.0	<1	--	--	--	--	11.1	Yes			

TABLE 5-7: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals		
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?	
EOS-1	OS	AU37	4E-04	7E+02	7E+02	Metal	Arsenic	C	3.2 - 10	6.90E+00	8/12	4.26E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes	
EOS-1	OS	AV37	2E-04	3E+02	3E+02	Pest/PCB	Aroclor-1260	C/NC	0.065 - 6600	1.54E+03	6/12	4.17E-04	34.1	65.9	0.0		7.30E+02	34.1	65.9	0.0		--	--	
						VOC	1,2,4-Trichlorobenzene	NC	0.26 - 830	8.30E+02	3/12	1.38E-07	--	--	--		3.69E+00	7.3	0.0	92.7		--	--	
						Metal	Arsenic	C	3.3 - 24	1.06E+01	19/19	6.55E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes	
EOS-1	OS	AW37	6E-06	<1	<1	Pest/PCB	Aroclor-1260	C/NC	0.055 - 3700	5.37E+02	13/19	1.45E-04	34.1	65.9	0.0		2.55E+02	34.1	65.9	0.0		--	--	
						Metal	Arsenic	C	8 - 9.9	9.90E+00	2/2	6.10E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No	
EOS-2	OS	AX36	1E-05	4E+00	<1	Metal	Arsenic	C	0.66 - 95.5	1.59E+01	14/21	9.79E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes	
EOS-2	OS	AX37	8E-06	2E+00	<1	Metal	Arsenic	C	4 - 5.2	5.20E+00	3/3	3.21E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No	
EOS-2	OS	AY36	6E-05	3E+01	2E+01	PAH	Benzo(a)pyrene	C	0.24 - 2.1	2.10E+00	2/2	3.25E-06	35.8	64.2	0.0		--	--	--	--		--	--	
						Metal	Arsenic	C/NC	2 - 200	7.28E+01	16/16	4.49E-05	70.7	29.3	0.0		1.11E+00	70.6	29.3	0.1		11.1	Yes	
						Pest/PCB	Aroclor-1260	C/NC	0.013 - 47	4.70E+01	12/16	1.27E-05	34.1	65.9	0.0		2.23E+01	34.1	65.9	0.0		--	--	
EOS-2	OS	AY37	1E-05	5E+00	2E+00	Metal	Arsenic	C	3.1 - 19.7	1.42E+01	10/10	8.77E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes	
						Metal	Lead	--	14.4 - 1480	1.48E+03	10/10	--	--	--	--		--	--	--	--		8.99	Yes	
						Pest/PCB	Aroclor-1260	C/NC	0.19 - 12	5.00E+00	6/11	1.35E-06	34.1	65.9	0.0		2.37E+00	34.1	65.9	0.0		--	--	
EOS-2	OS	AZ36	5E-05	5E+00	2E+00	SVOC	n-Nitroso-di-n-propylamine	C	2.8 - 2.8	2.80E+00	1/11	2.15E-06	42.0	58.0	0.0		--	--	--	--		--	--	
						Metal	Arsenic	C	0.72 - 63	3.12E+01	24/25	1.93E-05	70.7	29.3	0.0		<1	--	--	--		11.1	No	
						Lead	--	1.5 - 1700	1.18E+03	24/25	--	--	--	--	--		--	--	--	--		8.99	Yes	
EOS-2	OS	AZ37	1E-05	4E+00	<1	PAH	Benzo(a)anthracene	C	0.087 - 14	1.40E+01	5/10	2.17E-06	35.8	64.2	0.0		--	--	--	--		--	--	
						Benzo(a)pyrene	C	0.053 - 11	1.10E+01	4/10	1.70E-05	35.8	64.2	0.0		--	--	--	--		--	--		
						Benzo(b)fluoranthene	C	0.19 - 30	3.00E+01	5/10	4.64E-06	35.8	64.2	0.0		--	--	--	--		--	--		
EOS-2	OS	BA36	4E-05	3E+00	<1	Benzo(k)fluoranthene	C	0.11 - 6.9	6.90E+00	4/10	1.07E-06	35.8	64.2	0.0		--	--	--	--		--	--		
						Dibenz(a,h)anthracene	C	0.16 - 2.1	2.10E+00	2/10	1.98E-06	35.8	64.2	0.0		--	--	--	--		--	--		
						Indeno(1,2,3-cd)pyrene	C	0.04 - 9.8	9.80E+00	4/10	1.52E-06	35.8	64.2	0.0		--	--	--	--		--	--		
EOS-2	OS	AZ37	1E-05	4E+00	<1	Pest/PCB	Aroclor-1260	C/NC	0.016 - 4.1	4.10E+00	14/25	1.11E-06	34.1	65.9	0.0		1.94E+00	34.1	65.9	0.0		--	--	
EOS-2	OS	BB36	6E-06	2E+00	<1	Metal	Arsenic	C	2 - 35.1	1.67E+01	11/11	1.03E-05	70.7	29.3	0.0		<1	--	--	--		11.1	Yes	
						Lead	--	18.7 - 1140	1.14E+03	11/11	--	--	--	--		--	--	--	--		8.99	No		
						PAH	Benzo(a)pyrene	C	0.21 - 1.5	1.50E+00	5/12	2.32E-06	35.8	64.2	0.0		--	--	--	--		--	--	
EOS-2	OS	BA36	4E-05	3E+00	<1	Metal	Arsenic	C	0.59 - 641	5.93E+01	35/35	3.66E-05	70.7	29.3	0.0		<1	--	--	--		11.1	Yes	
EOS-2	OS	BC36	6E-06	2E+00	<1	PAH	Benzo(a)pyrene	C	0.058 - 3.1	2.52E+00	7/18	3.90E-06	35.8	64.2	0.0		--	--	--	--		--	--	
						Metal	Arsenic	C	3.2 - 11.2	7.24E+00	10/10	4.46E-06	70.7	29.3	0.0		<1	--	--	--	--		11.1	Yes
EOS-3	OS	BD35	4E-06	2E+00	<1	Metal	Arsenic	C	0.39 - 7.3	7.10E+00	5/5	4.38E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No	
EOS-3	OS	BE35	7E-06	2E+00	<1	Metal	Arsenic	C	2.7 - 6.8	6.80E+00	3/3	4.19E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No	
EOS-3	OS	BE36	2E-05	3E+00	<1	Metal	Arsenic	C	1.2 - 12.6	5.23E+00	20/24	3.23E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes	
						Lead	--	3.8 - 6130	5.02E+03	23/24	--	--	--	--		--	--	--	--		8.99	No		
						PAH	Benzo(a)pyrene	C	0.52 - 1.4	1.40E+00	2/18	2.17E-06	35.8	64.2	0.0		--	--	--	--		--	--	
EOS-3	OS	BF35	5E-06	<1	<1	Metal	Arsenic	C	2.2 - 34	2.97E+01	5/10	1.83E-05	70.7	29.3	0.0		<1	--	--	--		11.1	Yes	
						PAH	Benzo(a)pyrene	C	0.051 - 3.3	2.53E+00	7/10	3.92E-06	35.8	64.2	0.0		--	--	--	--		--	--	
EOS-3	OS	BF36	3E-05	<1	<1	Metal	Arsenic	C	0.87 - 22	7.01E+00	15/20	4.32E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes	
EOS-3	OS	BG35	7E-06	<1	<1	Metal	Arsenic	C	2.3 - 6.5	3.97E+00	6/11	2.45E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No	
						PAH	Benzo(a)anthracene	C	0.36 - 18	1.80E+01	3/11	2.79E-06	35.8	64.2	0.0		--	--	--	--		--	--	
						Benzo(a)pyrene	C	0.25 - 15	1.34E+01	5/11	2.07E-05	35.8	64.2	0.0		--	--	--	--		--	--		
EOS-3	OS	BG36	1E-05	2E+00	<1	Benzo(b)fluoranthene	C	0.038 - 12	1.20E+01	6/11	1.86E-06	35.8	64.2	0.0		--	--	--	--		--	--		
						Benzo(k)fluoranthene	C	14 - 14	1.40E+01	1/11	2.17E-06	35.8	64.2	0.0		--	--	--	--		--	--		
EOS-3	OS	BG36	1E-05	2E+00	<1	Metal	Arsenic	C	6.3 - 9.3	9.30E+00	2/2	5.73E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No	
EOS-3	OS	BG37	4E-05	5E+00	2E+00	PAH	Benzo(a)pyrene	C	3.9 - 19.3	1.11E+01	9/13	6.85E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No	
						Dioxin	2,3,4,7,8-PECDF	C	0.1 - 2	1.24E+00	10/13	1.92E-06	35.8	64.2	0.0		--	--	--	--		--	--	
						Metal	Antimony	NC	4.8 - 240	2.40E+02	2/2	--	--	--	--		1.94E+00	100.0	0.0	0.0		9.05	No	
EOS-3	OS	BH36	1E-05	1E+01	5E+00	Arsenic		C	4.6 - 30	3.00E+01	2/2	1.85E-05	70.7	29.3	0.0		<1	--	--	--		11.1	No	
						Lead	--	39 - 1800	1.80E+03	2/2	--	--	--	--		--	--	--	--		8.99	No		
						Dioxin	1,2,3,7,8-PECDD	C	0.00025 - 0.00025	2.50E-04	1/1	2.45E-06	70.7	29.3	0.0		--	--	--	--		--	--	
EOS-3	OS	BH36	1E-05	1E+01	5E+00	2,3,4,6,7,8-HxCDF	C	0.00125 - 0.00125	1.25E-03	1/1	1.22E-06	70.7	29.3	0.0		--	--	--	--		--	--		
						2,3,4,7,8-PECDF	C	0.00132 - 0.00132	1.32E-03	1/1	6.46E-06	70.7	29.3	0.0		--	--	--	--		--	--		
EOS-3	OS	BH36	1E-05	1E+01	5E+00	Metal	Arsenic	C	3.1 - 14	6.28E+00	10/16	3.87E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No	
						Lead	--	28.1 - 1500	9.53E+02	13/16	--	--	--	--		--	--	--	--		8.99	No		
						Vanadium	NC	27 - 1660	1.49E+03	15/16	--	--	--	--		4.81E+00	100.0	0.0	0.0		117.17	No		
EOS-3	OS	BH36	1E-05	1E+01	5E+00	PAH	Benzo(a)pyrene	C	0.06 - 0.96	9.60E-01	9/15	1.49E-06	35.8	64.2	0.0		--	--	--	--		--	--	
						Pest/PCB	Aroclor-1260	C/NC	0.02 - 5.6	5.60E+00	10/19	1.52E-06	34.1	65.9	0.0		2.65E+00	34.1	65.9	0.0		--	--	
						Dioxin	2,3,4,7,8-PECDF	C	0.000578 - 0.00057	5.78E-04	1/4	2.83E-06	70.7	29.3	0.0		--	--	--	--		--	--	

TABLE 5-7: TOTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				Metals	
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	HPAL	Maximum Concentration Exceeds HPAL?
EOS-3	OS	BH37	2E-05	2E+00	<1	Metal	Arsenic	C	3.4 - 28	2.29E+01	7/7	1.41E-05	70.7	29.3	0.0		<1	--	--	--		11.1	No
						Dioxin	2,3,4,7,8-PECDF	C	0.000673 - 0.0003	3.21E-04	4/4	1.57E-06	70.7	29.3	0.0		--	--	--		--	--	
EOS-3	OS	BI35	3E-06	<1	<1	Metal	Arsenic	C	2.4 - 4.7	3.84E+00	5/6	2.37E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
EOS-3	OS	BI36	1E-05	2E+00	<1	Metal	Arsenic	C	1.2 - 73	1.53E+01	17/22	9.44E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)pyrene	C	0.038 - 0.73	7.30E-01	10/21	1.13E-06	35.8	64.2	0.0		--	--	--		--	--	
EOS-3	OS	BI37	2E-05	7E+00	3E+00	Metal	Arsenic	C	9.3 - 18	1.60E+01	5/5	9.85E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
							Lead	--	330 - 4700	3.34E+03	5/5	--	--	--	--		--	--	--		8.99	No	
							Vanadium	NC	53 - 880	8.80E+02	5/5	--	--	--	--		2.84E+00	100.0	0.0	0.0		117.17	No
						Pest/PCB	Aroclor-1260	C/NC	0.17 - 4	4.00E+00	5/5	1.08E-06	34.1	65.9	0.0		1.90E+00	34.1	65.9	0.0		--	--
						Dioxin	2,3,4,7,8-PECDF	C	0.00013 - 0.00041	3.73E-04	4/5	1.82E-06	70.7	29.3	0.0		--	--	--		--	--	
EOS-3	OS	BJ36	2E-05	5E+00	2E+00	Metal	Antimony	NC	170 - 170	1.70E+02	1/1	--	--	--	--		1.37E+00	100.0	0.0	0.0		9.05	No
							Arsenic	C	18 - 18	1.80E+01	1/1	1.11E-05	70.7	29.3	0.0		<1	--	--	--		11.1	No
							Copper	NC	21000 - 21000	2.10E+04	1/1	--	--	--	--		1.83E+00	100.0	0.0	0.0		124.31	Yes
							Lead	--	1900 - 1900	1.90E+03	1/1	--	--	--	--		--	--	--	--		8.99	Yes
						Dioxin	1,2,3,7,8-PECDD	C	0.000235 - 0.00023	2.35E-04	1/1	2.30E-06	70.7	29.3	0.0		--	--	--	--		--	--
							2,3,4,7,8-PECDF	C	0.000796 - 0.00079	7.96E-04	1/1	3.90E-06	70.7	29.3	0.0		--	--	--	--		--	--
EOS-4	OS	AF26	3E-06	<1	<1	Metal	Arsenic	C	5.4 - 5.4	5.40E+00	1/2	3.33E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
EOS-4	OS	AG27	2E-06	2E+00	<1	Metal	Arsenic	C	3.2 - 3.2	3.20E+00	1/2	1.97E-06	70.7	29.3	0.0		<1	--	--	--		11.1	No
EOS-5	OS	ZZ01	1E-05	<1	<1	Metal	Arsenic	C	1.8 - 12.8	4.09E+00	34/39	2.52E-06	70.7	29.3	0.0		<1	--	--	--		11.1	Yes
						PAH	Benzo(a)anthracene	C	0.031 - 8.8	8.80E+00	3/39	1.36E-06	35.8	64.2	0.0		--	--	--	--		--	--
							Benzo(a)pyrene	C	0.052 - 13	2.78E+00	4/39	4.30E-06	35.8	64.2	0.0		--	--	--	--		--	--
							Benzo(b)fluoranthene	C	0.068 - 21	2.10E+01	3/39	3.25E-06	35.8	64.2	0.0		--	--	--	--		--	--
							Dibenz(a,h)anthracene	C	0.075 - 1.7	1.70E+00	2/39	1.60E-06	35.8	64.2	0.0		--	--	--	--		--	--

- Notes: All concentrations shown in mg/kg.
- <1

Less than 1
- Not applicable or chemical is not a chemical of concern for this endpoint
- Not evaluated because exposure pathway is incomplete
- bgs

Below ground surface
- C

Cancer effect
- COC

Chemical of concern
- DF

Detection frequency
- EPC

Exposure point concentration
- HI

Hazard index
- HPAL

Hunters Point ambient level
- HXCDF

Hexachlorodibenzofuran
- IND

Industrial (industrial exposure scenario)
- mg/kg

Milligram per kilogram
- MI

Maritime/Industrial (industrial exposure scenario)
- MU

Mixed use (residential exposure scenario)
- NC

Noncancer effect
- PAH

Polynuclear aromatic hydrocarbon
- PCB

Polychlorinated biphenyl
- PECDD

Pentachlorodibenzo-p-dioxin
- PECDF

Pentachlorodibenzofuran
- Pest

Pesticide
- OS

Open space (recreational exposure scenario)
- RD

Residential development
- RME

Reasonable maximum exposure
- SVOC

Semivolatile organic compound
- VOC

Volatile organic compound

TABLE 5-8: INCREMENTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SURFACE SOIL (0 TO 2 FEET BGS)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
31B/36	IND	AP27	3E-08	<1	<1
31B/36	IND	AR27	--	<1	<1
31B/36	IND	AR28	--	<1	<1
31B/36	IND	AS27	3E-07	<1	<1
31B/36	IND	AS28	1E-06	<1	<1
31B/36	IND	AS29	9E-06	<1	<1
31B/36	IND	AT27	7E-08	<1	<1
31B/36	IND	AT28	4E-08	<1	<1
31B/36	IND	AT29	3E-04	<1	<1
31B/36	IND	AU28	1E-06	<1	<1
31B/36	IND	AU29	2E-04	<1	<1
31B/36	IND	AU30	5E-08	<1	<1
31B/36	IND	AU31	4E-07	<1	<1
31B/36	IND	AV29	1E-04	<1	<1
31B/36	IND	AV30	5E-06	<1	<1
40	IND	AW31	3E-05	<1	<1
40	IND	AX33	1E-07	<1	<1
40	IND	AY33	1E-07	<1	<1
40	IND	AZ33	1E-07	<1	<1
40	IND	AZ34	8E-07	<1	<1
40	IND	BA33	6E-06	<1	<1
41	IND	BA29	1E-06	<1	<1
41	IND	BA30	2E-06	<1	<1
41	IND	BA31	--	<1	<1
41	IND	BA32	2E-07	<1	<1
41	IND	BB29	5E-08	<1	<1
41	IND	BB30	3E-05	<1	<1
41	IND	BB31	8E-09	<1	<1
43	IND	AN30	5E-07	<1	<1
43	IND	AO28	--	<1	<1
43	IND	AO29	--	<1	<1
43	IND	AO30	5E-06	<1	<1
43	IND	AO31	2E-08	<1	<1
43	IND	AP29	2E-04	<1	<1
43	IND	AP30	3E-07	<1	<1
43	IND	AP31	2E-06	<1	<1
43	IND	AQ30	2E-05	<1	<1
43	IND	AQ32	7E-10	<1	<1
43	IND	AR29	7E-09	<1	<1
43	IND	AR30	--	<1	<1
43	IND	AR31	3E-05	<1	<1
43	IND	AR32	3E-06	<1	<1
43	IND	AR33	4E-08	<1	<1
43	IND	AS30	2E-06	<1	<1
43	IND	AS31	1E-07	<1	<1
43	IND	AS32	3E-05	<1	<1
43	IND	AS33	2E-07	<1	<1
43	IND	AS34	8E-10	<1	<1
43	IND	AT30	1E-08	<1	<1
43	IND	AT31	1E-07	<1	<1
43	IND	AT32	3E-05	<1	<1
43	IND	AT33	2E-05	<1	<1
43	IND	AT34	3E-10	<1	<1
43	IND	AU32	3E-06	<1	<1
43	IND	AU33	5E-07	<1	<1

TABLE 5-8: INCREMENTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SURFACE SOIL (0 TO 2 FEET BGS) (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
43	IND	AU34	3E-06	<1	<1
43	IND	AV32	1E-06	<1	<1
43	IND	AV33	5E-05	<1	<1
43	IND	AV34	4E-06	<1	<1
43	IND	AW33	6E-07	<1	<1
43	IND	AW34	2E-05	<1	<1
44	IND	AL32	7E-06	<1	<1
44	IND	AM31	--	<1	<1
44	IND	AM32	6E-06	<1	<1
44	IND	AM33	1E-05	<1	<1
44	IND	AM34	1E-05	<1	<1
44	IND	AM35	8E-05	<1	<1
44	IND	AN31	--	<1	<1
44	IND	AN32	--	<1	<1
44	IND	AN33	1E-05	<1	<1
44	IND	AO35	4E-07	<1	<1
44	IND	AP34	1E-06	<1	<1
44	IND	AP35	1E-06	<1	<1
44	IND	AP36	1E-06	<1	<1
44	IND	AP37	7E-06	<1	<1
44	IND	AQ33	5E-10	<1	<1
44	IND	AQ35	4E-06	<1	<1
44	IND	AQ36	3E-05	<1	<1
44	IND	AQ37	1E-07	--	--
44	IND	AR34	9E-07	<1	<1
44	IND	AR35	2E-06	<1	<1
44	IND	AR36	3E-06	<1	<1
44	IND	AR37	1E-06	<1	<1
44	IND	AS36	5E-07	<1	<1
44	IND	AU35	3E-10	<1	<1
44	IND	AU36	2E-07	<1	<1
44	IND	AV36	3E-05	<1	<1
44	IND	AW35	7E-08	<1	<1
44	IND	AW36	2E-06	<1	<1
44	IND	AX35	--	<1	<1
44	IND	AY35	3E-05	<1	<1
45	RD	032075	--	<1	<1
45	RD	033077	--	8E+00	7E+00
45	RD	034074	--	<1	<1
45	RD	035079	4E-04	<1	<1
45	RD	036074	--	9E+00	3E+00
45	RD	037076	8E-10	4E+00	3E+00
45	RD	038074	2E-07	4E+00	3E+00
45	RD	038079	6E-04	2E+01	2E+01
45	RD	039081	--	<1	<1
45	RD	040073	--	<1	<1
45	RD	040074	--	<1	<1
45	RD	040075	--	5E+00	5E+00
45	RD	040082	1E-07	<1	<1
45	RD	041082	4E-05	<1	<1
45	RD	042073	--	5E+00	3E+00
45	RD	042081	4E-04	<1	<1
45	RD	042082	4E-05	9E+00	5E+00
45	RD	043081	5E-04	<1	<1
45	RD	043082	--	<1	<1

TABLE 5-8: INCREMENTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SURFACE SOIL (0 TO 2 FEET BGS) (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
45	RD	044073	--	<1	<1
45	RD	044079	4E-04	4E+00	3E+00
45	RD	044080	8E-08	<1	<1
45	RD	044081	2E-07	<1	<1
45	RD	045073	--	<1	<1
45	RD	045074	1E-05	4E+00	3E+00
45	RD	045075	2E-08	4E+00	3E+00
45	RD	045078	--	<1	<1
45	RD	045080	1E-07	<1	<1
45	RD	046072	4E-08	2E+00	<1
45	RD	046074	3E-06	2E+01	1E+01
45	RD	046076	6E-08	<1	<1
45	RD	046077	1E-07	<1	<1
45	RD	046079	1E-07	<1	<1
45	RD	046080	--	<1	<1
45	RD	046082	8E-06	5E+01	3E+01
45	RD	047076	1E-08	<1	<1
45	RD	047077	1E-07	<1	<1
45	RD	047086	4E-08	<1	<1
45	RD	047089	4E-06	3E+00	<1
45	RD	047092	4E-09	<1	<1
45	RD	048072	1E-05	3E+00	3E+00
45	RD	048076	7E-09	<1	<1
45	RD	048080	7E-06	7E+01	7E+01
45	RD	049079	2E-05	9E+00	4E+00
45	RD	049085	--	<1	<1
45	RD	049088	--	<1	<1
45	RD	049091	7E-10	<1	<1
45	RD	050071	5E-09	<1	<1
45	RD	050077	5E-06	3E+00	2E+00
45	RD	050083	--	2E+00	2E+00
45	RD	050086	5E-06	<1	<1
45	RD	050088	--	<1	<1
45	RD	052071	5E-09	<1	<1
45	RD	052075	--	<1	<1
45	RD	052082	3E-07	<1	<1
45	RD	052085	4E-08	2E+00	2E+00
45	RD	053080	8E-08	<1	<1
45	RD	053081	2E-08	3E+00	3E+00
45	RD	053082	8E-08	<1	<1
45	RD	053083	2E-08	<1	<1
45	RD	053085	4E-06	<1	<1
45	RD	054071	3E-08	<1	<1
45	RD	054074	2E-06	2E+00	<1
45	RD	054075	--	<1	<1
45	RD	054077	--	2E+00	<1
45	RD	054079	--	<1	<1
45	RD	054081	8E-08	2E+00	2E+00
45	RD	055073	--	<1	<1
45	RD	059078	8E-08	<1	<1
EMI-1	MI	AZ35	1E-06	<1	<1
EMI-1	MI	BA34	4E-06	<1	<1
EMI-1	MI	BA35	2E-08	<1	<1
EMI-1	MI	BB32	6E-06	<1	<1
EMI-1	MI	BB33	1E-05	<1	<1

TABLE 5-8: INCREMENTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SURFACE SOIL (0 TO 2 FEET BGS) (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
EMI-1	MI	BB34	3E-05	<1	<1
EMI-1	MI	BB35	2E-08	<1	<1
EMI-1	MI	BC32	--	<1	<1
EMI-1	MI	BC33	2E-06	<1	<1
EMI-1	MI	BC34	2E-07	<1	<1
EMI-1	MI	BC35	2E-08	<1	<1
EMI-1	MI	BD31	--	<1	<1
EMI-1	MI	BD32	3E-05	<1	<1
EMI-1	MI	BD33	6E-05	<1	<1
EMI-1	MI	BD34	2E-05	<1	<1
EMI-1	MI	BE30	4E-07	<1	<1
EMI-1	MI	BE31	3E-05	<1	<1
EMI-1	MI	BE32	7E-06	<1	<1
EMI-1	MI	BE33	1E-06	<1	<1
EMI-1	MI	BE34	5E-05	3E+00	3E+00
EMI-1	MI	BF31	1E-04	<1	<1
EMI-1	MI	BF32	8E-08	<1	<1
EMI-1	MI	BF33	4E-09	<1	<1
EMI-1	MI	BF34	4E-07	<1	<1
EMI-1	MI	BG32	6E-06	<1	<1
EMI-1	MI	BG33	8E-06	<1	<1
EMI-1	MI	BG34	4E-06	<1	<1
EMI-1	MI	BH33	7E-07	<1	<1
EMI-1	MI	BH34	2E-08	<1	<1
EMI-1	MI	BI32	2E-08	<1	<1
EMI-1	MI	BI34	2E-04	<1	<1
EMI-1	MI	BJ33	3E-05	<1	<1
EOS-1	OS	AL35	3E-05	<1	<1
EOS-1	OS	AL36	1E-04	3E+00	<1
EOS-1	OS	AL37	1E-06	<1	<1
EOS-1	OS	AM36	1E-04	1E+01	1E+01
EOS-1	OS	AM37	1E-04	5E+00	3E+00
EOS-1	OS	AM38	6E-05	2E+00	<1
EOS-1	OS	AN36	--	<1	<1
EOS-1	OS	AN37	2E-05	2E+00	2E+00
EOS-1	OS	AN38	1E-04	4E+00	3E+00
EOS-1	OS	AN39	3E-06	<1	<1
EOS-1	OS	AO37	7E-10	<1	<1
EOS-1	OS	AO39	2E-06	<1	<1
EOS-1	OS	AP38	--	<1	<1
EOS-1	OS	AQ39	2E-07	<1	<1
EOS-1	OS	AQ40	7E-06	<1	<1
EOS-1	OS	AR39	2E-06	<1	<1
EOS-1	OS	AR40	2E-04	1E+01	1E+01
EOS-1	OS	AS38	2E-04	<1	<1
EOS-1	OS	AT38	6E-06	<1	<1
EOS-1	OS	AT39	3E-05	<1	<1
EOS-1	OS	AU37	9E-03	2E+03	2E+03
EOS-1	OS	AV37	5E-03	9E+02	9E+02
EOS-1	OS	AW37	2E-06	<1	<1
EOS-2	OS	AX36	2E-04	2E+00	<1
EOS-2	OS	AX37	2E-05	<1	<1
EOS-2	OS	AY36	1E-04	<1	<1
EOS-2	OS	AY37	7E-05	4E+00	3E+00
EOS-2	OS	AZ36	3E-04	3E+00	<1

**TABLE 5-8: INCREMENTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY
PLANNED REUSE, SURFACE SOIL (0 TO 2 FEET BGS) (CONTINUED)**

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
EOS-2	OS	AZ37	7E-05	<1	<1
EOS-2	OS	BA36	1E-03	5E+00	3E+00
EOS-2	OS	BA37	4E-06	<1	<1
EOS-2	OS	BB36	3E-05	<1	<1
EOS-3	OS	BC36	6E-06	<1	<1
EOS-3	OS	BD35	2E-09	<1	<1
EOS-3	OS	BE35	2E-05	<1	<1
EOS-3	OS	BE36	4E-06	<1	<1
EOS-3	OS	BF35	2E-06	<1	<1
EOS-3	OS	BF36	1E-04	<1	<1
EOS-3	OS	BG35	6E-06	<1	<1
EOS-3	OS	BG36	5E-05	<1	<1
EOS-3	OS	BH36	1E-05	<1	<1
EOS-3	OS	BI35	4E-08	<1	<1
EOS-3	OS	BI36	2E-04	<1	<1
EOS-4	OS	AF26	5E-11	<1	<1
EOS-4	OS	AG27	--	<1	<1
EOS-5	OS	ZZ01	2E-05	<1	<1

Notes: Bolded values exceed the threshold level of 1E-06 for cancer risks and 1.0 for segregated noncancer hazards.

<1 Less than 1
 -- Not applicable
 bgs Below ground surface
 HI Hazard index
 IND Industrial (industrial exposure scenario)
 MI Maritime/industrial (industrial exposure scenario)
 OS Open space (recreational exposure scenario)
 RD Research and development
 RME Reasonable maximum exposure

**TABLE 5-9: INCREMENTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY
PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS)**

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
31A	MU	058073	3E-06	<1	<1
31A	MU	060074	--	1E+01	6E+00
31B/36	IND	AP27	4E-08	<1	<1
31B/36	IND	AQ26	2E-08	<1	<1
31B/36	IND	AQ28	6E-10	<1	<1
31B/36	IND	AR27	5E-08	<1	<1
31B/36	IND	AR28	2E-05	<1	<1
31B/36	IND	AS26	8E-11	<1	<1
31B/36	IND	AS27	4E-07	<1	<1
31B/36	IND	AS28	2E-06	<1	<1
31B/36	IND	AS29	3E-05	<1	<1
31B/36	IND	AT26	--	<1	<1
31B/36	IND	AT27	8E-08	<1	<1
31B/36	IND	AT28	3E-07	<1	<1
31B/36	IND	AT29	1E-04	<1	<1
31B/36	IND	AU28	8E-07	<1	<1
31B/36	IND	AU29	2E-04	<1	<1
31B/36	IND	AU30	6E-08	<1	<1
31B/36	IND	AU31	2E-06	<1	<1
31B/36	IND	AV29	9E-05	<1	<1
31B/36	IND	AV30	5E-06	<1	<1
40	IND	AW31	3E-05	<1	<1
40	IND	AX31	2E-08	<1	<1
40	IND	AX33	1E-07	<1	<1
40	IND	AY31	--	<1	<1
40	IND	AY33	2E-07	<1	<1
40	IND	AZ32	--	<1	<1
40	IND	AZ33	1E-07	<1	<1
40	IND	AZ34	8E-07	<1	<1
40	IND	BA33	4E-05	<1	<1
41	IND	AX29	--	<1	<1
41	IND	AX30	3E-06	<1	<1
41	IND	AZ29	7E-07	<1	<1
41	IND	BA29	1E-05	<1	<1
41	IND	BA30	1E-05	<1	<1
41	IND	BA31	1E-07	<1	<1
41	IND	BA32	2E-07	<1	<1
41	IND	BB29	6E-08	<1	<1
41	IND	BB30	1E-05	<1	<1
41	IND	BB31	9E-09	<1	<1
43	IND	AN30	7E-07	<1	<1
43	IND	AO28	1E-08	<1	<1
43	IND	AO29	--	<1	<1
43	IND	AO30	3E-06	<1	<1
43	IND	AO31	1E-06	<1	<1
43	IND	AP28	--	<1	<1
43	IND	AP29	2E-04	<1	<1
43	IND	AP30	3E-07	<1	<1
43	IND	AP31	2E-06	<1	<1
43	IND	AQ29	3E-09	<1	<1
43	IND	AQ30	3E-05	<1	<1
43	IND	AQ32	7E-10	<1	<1
43	IND	AR29	3E-08	<1	<1
43	IND	AR30	7E-08	<1	<1
43	IND	AR31	2E-05	<1	<1

TABLE 5-9: INCREMENTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS) (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
43	IND	AR32	3E-05	<1	<1
43	IND	AR33	4E-08	<1	<1
43	IND	AS30	2E-06	<1	<1
43	IND	AS31	2E-07	<1	<1
43	IND	AS32	6E-05	<1	<1
43	IND	AS33	1E-05	<1	<1
43	IND	AS34	2E-07	<1	<1
43	IND	AT30	2E-07	<1	<1
43	IND	AT31	3E-06	<1	<1
43	IND	AT32	3E-04	<1	<1
43	IND	AT33	9E-06	<1	<1
43	IND	AT34	3E-10	<1	<1
43	IND	AU32	2E-05	<1	<1
43	IND	AU33	3E-05	<1	<1
43	IND	AU34	3E-06	<1	<1
43	IND	AV32	8E-05	<1	<1
43	IND	AV33	1E-05	<1	<1
43	IND	AV34	2E-05	<1	<1
43	IND	AW33	4E-05	<1	<1
43	IND	AW34	2E-05	<1	<1
43	IND	AX34	8E-10	<1	<1
44	IND	AL32	7E-06	<1	<1
44	IND	AM31	1E-08	<1	<1
44	IND	AM32	4E-05	3E+00	3E+00
44	IND	AM33	3E-05	<1	<1
44	IND	AM34	3E-05	<1	<1
44	IND	AM35	8E-05	7E+00	6E+00
44	IND	AN31	--	<1	<1
44	IND	AN32	--	<1	<1
44	IND	AN33	6E-06	<1	<1
44	IND	AO35	6E-07	<1	<1
44	IND	AO36	3E-07	<1	<1
44	IND	AP32	2E-05	<1	<1
44	IND	AP33	--	<1	<1
44	IND	AP34	1E-06	<1	<1
44	IND	AP35	1E-06	<1	<1
44	IND	AP36	1E-06	<1	<1
44	IND	AP37	6E-06	<1	<1
44	IND	AQ33	2E-07	<1	<1
44	IND	AQ35	5E-05	1E+01	1E+01
44	IND	AQ36	3E-05	<1	<1
44	IND	AQ37	1E-07	<1	<1
44	IND	AR34	9E-07	<1	<1
44	IND	AR35	1E-05	<1	<1
44	IND	AR36	4E-05	<1	<1
44	IND	AR37	2E-06	<1	<1
44	IND	AS36	5E-07	<1	<1
44	IND	AU35	4E-10	<1	<1
44	IND	AU36	2E-07	<1	<1
44	IND	AV36	3E-05	<1	<1
44	IND	AW35	8E-08	<1	<1
44	IND	AW36	2E-05	<1	<1
44	IND	AX35	--	<1	<1
44	IND	AY35	3E-05	<1	<1
45	RD	032075	--	<1	<1

TABLE 5-9: INCREMENTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS) (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
45	RD	033077	--	8E+00	7E+00
45	RD	034074	--	<1	<1
45	RD	035079	4E-04	<1	<1
45	RD	036074	--	9E+00	3E+00
45	RD	037074	--	<1	<1
45	RD	037076	8E-10	4E+00	3E+00
45	RD	038074	7E-08	4E+00	2E+00
45	RD	038077	--	<1	<1
45	RD	038079	6E-04	2E+01	2E+01
45	RD	039075	6E-09	3E+00	3E+00
45	RD	039076	1E-07	<1	<1
45	RD	039081	--	<1	<1
45	RD	040073	--	3E+00	2E+00
45	RD	040074	--	<1	<1
45	RD	040075	4E-09	5E+00	5E+00
45	RD	040077	--	<1	<1
45	RD	040079	2E-09	<1	<1
45	RD	040082	3E-05	<1	<1
45	RD	041075	2E-07	4E+00	3E+00
45	RD	041079	--	6E+00	4E+00
45	RD	041082	3E-04	1E+01	6E+00
45	RD	042073	3E-04	1E+01	4E+00
45	RD	042074	--	5E+00	3E+00
45	RD	042081	3E-04	3E+00	2E+00
45	RD	042082	4E-05	9E+00	5E+00
45	RD	043075	--	<1	<1
45	RD	043081	5E-04	5E+00	3E+00
45	RD	043082	2E-06	5E+00	5E+00
45	RD	044073	--	<1	<1
45	RD	044079	4E-04	4E+00	3E+00
45	RD	044080	--	<1	<1
45	RD	044081	2E-07	<1	<1
45	RD	045073	--	<1	<1
45	RD	045074	1E-05	8E+00	3E+00
45	RD	045075	--	1E+01	4E+00
45	RD	045077	--	<1	<1
45	RD	045078	1E-03	4E+00	3E+00
45	RD	045080	2E-07	<1	<1
45	RD	046072	4E-08	2E+00	<1
45	RD	046074	3E-06	2E+01	1E+01
45	RD	046076	6E-08	3E+00	3E+00
45	RD	046077	2E-07	<1	<1
45	RD	046079	1E-07	<1	<1
45	RD	046080	--	<1	<1
45	RD	046082	4E-04	6E+01	3E+01
45	RD	047074	3E-04	9E+00	6E+00
45	RD	047075	--	<1	<1
45	RD	047076	1E-06	4E+00	4E+00
45	RD	047077	1E-07	<1	<1
45	RD	047086	4E-08	<1	<1
45	RD	047089	4E-06	3E+00	<1
45	RD	047092	4E-09	<1	<1
45	RD	048072	1E-05	3E+00	3E+00
45	RD	048075	--	<1	<1
45	RD	048076	7E-09	<1	<1

TABLE 5-9: INCREMENTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS) (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
45	RD	048077	--	<1	<1
45	RD	048080	7E-06	7E+01	7E+01
45	RD	048089	--	3E+00	3E+00
45	RD	049075	7E-08	3E+00	3E+00
45	RD	049076	1E-08	<1	<1
45	RD	049077	--	<1	<1
45	RD	049079	2E-05	9E+00	4E+00
45	RD	049085	2E-09	<1	<1
45	RD	049088	3E-04	<1	<1
45	RD	049089	--	<1	<1
45	RD	049091	5E-07	2E+00	<1
45	RD	050071	7E-09	2E+00	2E+00
45	RD	050074	--	<1	<1
45	RD	050077	6E-06	4E+00	2E+00
45	RD	050080	4E-04	4E+00	3E+00
45	RD	050083	--	2E+00	2E+00
45	RD	050084	3E-08	<1	<1
45	RD	050086	5E-06	<1	<1
45	RD	050088	--	<1	<1
45	RD	051072	--	<1	<1
45	RD	051076	--	<1	<1
45	RD	051084	1E-09	<1	<1
45	RD	051085	2E-09	<1	<1
45	RD	051086	--	<1	<1
45	RD	052071	5E-09	<1	<1
45	RD	052075	--	6E+00	4E+00
45	RD	052082	3E-07	<1	<1
45	RD	052083	4E-04	3E+01	2E+01
45	RD	052084	3E-09	<1	<1
45	RD	052085	3E-07	3E+00	2E+00
45	RD	053080	8E-08	<1	<1
45	RD	053081	3E-04	4E+00	3E+00
45	RD	053082	8E-08	<1	<1
45	RD	053083	2E-08	2E+00	2E+00
45	RD	053085	4E-06	3E+00	2E+00
45	RD	054071	4E-08	<1	<1
45	RD	054074	2E-06	7E+00	3E+00
45	RD	054075	--	3E+00	3E+00
45	RD	054077	--	2E+00	<1
45	RD	054079	--	<1	<1
45	RD	054081	1E-07	4E+00	3E+00
45	RD	055073	--	2E+00	2E+00
45	RD	055078	4E-08	<1	<1
45	RD	058078	2E-08	<1	<1
45	RD	059078	1E-07	8E+00	3E+00
EMI-1	MI	AZ35	1E-06	<1	<1
EMI-1	MI	BA34	2E-05	<1	<1
EMI-1	MI	BA35	5E-07	<1	<1
EMI-1	MI	BB32	6E-06	<1	<1
EMI-1	MI	BB33	4E-05	<1	<1
EMI-1	MI	BB34	2E-05	<1	<1
EMI-1	MI	BB35	2E-08	<1	<1
EMI-1	MI	BC32	--	<1	<1
EMI-1	MI	BC33	3E-05	<1	<1
EMI-1	MI	BC34	1E-06	<1	<1

**TABLE 5-9: INCREMENTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY
PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS) (CONTINUED)**

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
EMI-1	MI	BC35	8E-10	<1	<1
EMI-1	MI	BD31	--	<1	<1
EMI-1	MI	BD32	1E-04	<1	<1
EMI-1	MI	BD33	3E-05	<1	<1
EMI-1	MI	BD34	3E-05	<1	<1
EMI-1	MI	BE30	4E-07	<1	<1
EMI-1	MI	BE31	3E-05	<1	<1
EMI-1	MI	BE32	3E-05	<1	<1
EMI-1	MI	BE33	2E-05	<1	<1
EMI-1	MI	BE34	5E-05	3E+00	3E+00
EMI-1	MI	BF31	1E-04	<1	<1
EMI-1	MI	BF32	8E-08	<1	<1
EMI-1	MI	BF33	6E-07	<1	<1
EMI-1	MI	BF34	2E-06	<1	<1
EMI-1	MI	BG32	6E-06	<1	<1
EMI-1	MI	BG33	5E-06	<1	<1
EMI-1	MI	BG34	4E-05	<1	<1
EMI-1	MI	BH33	8E-07	<1	<1
EMI-1	MI	BH34	2E-08	<1	<1
EMI-1	MI	BI32	5E-08	<1	<1
EMI-1	MI	BI34	2E-04	<1	<1
EMI-1	MI	BJ32	2E-06	<1	<1
EMI-1	MI	BJ33	3E-05	<1	<1
EMI-1	MI	BK32	6E-06	<1	<1

Notes: Bolded values exceed the threshold level of 1E-06 for cancer risks and 1.0 for segregated noncancer hazards.

<1 Less than 1
 -- Not applicable
 bgs Below ground surface
 HI Hazard index
 IND Industrial (industrial exposure scenario)
 MI Maritime/industrial (industrial exposure scenario)
 MU Mixed use (residential exposure scenario)
 RD Research and development
 RME Reasonable maximum exposure

TABLE 5-10: INCREMENTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
31A	MU	AO25	4E-09	<1	<1
31A	MU	AP26	--	2E+00	<1
31B/36	IND	AP27	2E-09	<1	<1
31B/36	IND	AQ26	4E-09	<1	<1
31B/36	IND	AQ28	3E-11	<1	<1
31B/36	IND	AR27	2E-09	<1	<1
31B/36	IND	AR28	6E-06	<1	<1
31B/36	IND	AS26	2E-11	<1	<1
31B/36	IND	AS27	8E-08	<1	<1
31B/36	IND	AS28	5E-07	<1	<1
31B/36	IND	AS29	8E-06	<1	<1
31B/36	IND	AT26	--	<1	<1
31B/36	IND	AT27	1E-08	<1	<1
31B/36	IND	AT28	2E-08	<1	<1
31B/36	IND	AT29	3E-05	2E+00	<1
31B/36	IND	AU28	9E-08	<1	<1
31B/36	IND	AU29	7E-05	2E+00	2E+00
31B/36	IND	AU30	1E-08	<1	<1
31B/36	IND	AU31	4E-07	<1	<1
31B/36	IND	AV29	2E-05	2E+00	<1
31B/36	IND	AV30	1E-06	<1	<1
40	IND	AW31	7E-06	<1	<1
40	IND	AX31	6E-10	<1	<1
40	IND	AX33	3E-08	<1	<1
40	IND	AY31	--	<1	<1
40	IND	AY33	4E-08	<1	<1
40	IND	AZ32	--	<1	<1
40	IND	AZ33	3E-08	<1	<1
40	IND	AZ34	2E-07	<1	<1
40	IND	BA33	1E-05	5E+00	3E+00
41	IND	AX29	--	<1	<1
41	IND	AX30	7E-07	<1	<1
41	IND	AZ29	2E-07	<1	<1
41	IND	BA29	3E-06	<1	<1
41	IND	BA30	3E-06	<1	<1
41	IND	BA31	3E-08	<1	<1
41	IND	BA32	4E-08	2E+00	<1
41	IND	BB29	2E-08	<1	<1
41	IND	BB30	3E-06	<1	<1
41	IND	BB31	2E-09	<1	<1
43	IND	AN30	2E-07	<1	<1
43	IND	AO28	9E-10	<1	<1
43	IND	AO29	--	<1	<1
43	IND	AO30	8E-07	2E+00	<1
43	IND	AO31	3E-07	<1	<1
43	IND	AP28	--	<1	<1
43	IND	AP29	6E-05	2E+00	2E+00
43	IND	AP30	7E-08	<1	<1
43	IND	AP31	5E-07	<1	<1
43	IND	AQ29	9E-10	<1	<1
43	IND	AQ30	8E-06	5E+00	5E+00
43	IND	AQ32	2E-10	<1	<1
43	IND	AR29	3E-09	<1	<1
43	IND	AR30	1E-08	<1	<1
43	IND	AR31	5E-06	<1	<1
43	IND	AR32	8E-06	<1	<1
43	IND	AR33	1E-08	<1	<1
43	IND	AS30	5E-07	2E+00	<1
43	IND	AS31	5E-08	<1	<1
43	IND	AS32	1E-05	<1	<1
43	IND	AS33	3E-06	<1	<1
43	IND	AS34	6E-08	<1	<1
43	IND	AT30	1E-08	<1	<1

TABLE 5-10: INCREMENTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
43	IND	AT31	9E-07	<1	<1
43	IND	AT32	9E-05	4E+00	2E+00
43	IND	AT33	3E-06	<1	<1
43	IND	AT34	9E-11	<1	<1
43	IND	AU32	6E-06	2E+00	<1
43	IND	AU33	9E-06	<1	<1
43	IND	AU34	7E-07	<1	<1
43	IND	AV32	1E-05	<1	<1
43	IND	AV33	3E-06	2E+00	<1
43	IND	AV34	5E-06	<1	<1
43	IND	AW33	1E-05	<1	<1
43	IND	AW34	6E-06	<1	<1
43	IND	AX34	3E-11	2E+00	<1
44	IND	AL32	2E-06	2E+00	2E+00
44	IND	AM31	1E-09	<1	<1
44	IND	AM32	1E-05	2E+01	2E+01
44	IND	AM33	8E-06	5E+00	2E+00
44	IND	AM34	8E-06	4E+00	3E+00
44	IND	AM35	2E-05	1E+01	6E+00
44	IND	AN31	--	<1	<1
44	IND	AN32	--	<1	<1
44	IND	AN33	2E-06	2E+00	<1
44	IND	AO35	1E-07	<1	<1
44	IND	AO36	7E-08	<1	<1
44	IND	AP32	7E-06	<1	<1
44	IND	AP33	--	<1	<1
44	IND	AP34	4E-07	<1	<1
44	IND	AP35	4E-07	<1	<1
44	IND	AP36	3E-07	<1	<1
44	IND	AP37	2E-06	2E+00	2E+00
44	IND	AQ33	4E-08	<1	<1
44	IND	AQ35	4E-06	2E+01	1E+01
44	IND	AQ36	7E-06	3E+00	2E+00
44	IND	AQ37	3E-08	<1	<1
44	IND	AR34	2E-07	2E+00	<1
44	IND	AR35	3E-06	<1	<1
44	IND	AR36	1E-05	2E+00	<1
44	IND	AR37	6E-07	<1	<1
44	IND	AS36	9E-08	<1	<1
44	IND	AU35	2E-11	<1	<1
44	IND	AU36	6E-08	<1	<1
44	IND	AV36	8E-06	<1	<1
44	IND	AW35	2E-08	<1	<1
44	IND	AW36	6E-06	<1	<1
44	IND	AX35	--	<1	<1
44	IND	AY35	7E-06	<1	<1
45	RD	AG26	--	<1	<1
45	RD	AH26	2E-11	2E+00	<1
45	RD	AH27	1E-05	<1	<1
45	RD	AI25	--	<1	<1
45	RD	AI26	6E-09	<1	<1
45	RD	AI27	2E-05	<1	<1
45	RD	AI28	1E-06	<1	<1
45	RD	AJ25	7E-06	2E+00	<1
45	RD	AJ26	1E-08	<1	<1
45	RD	AJ27	--	<1	<1
45	RD	AJ28	6E-06	<1	<1
45	RD	AK25	2E-09	<1	<1
45	RD	AK26	3E-06	2E+00	<1
45	RD	AK27	2E-05	<1	<1
45	RD	AK28	1E-05	<1	<1
45	RD	AL25	7E-07	<1	<1
45	RD	AL26	6E-08	<1	<1

TABLE 5-10: INCREMENTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
45	RD	AL27	9E-07	2E+00	2E+00
45	RD	AL28	4E-07	2E+00	<1
45	RD	AL29	5E-11	<1	<1
45	RD	AL30	5E-06	<1	<1
45	RD	AL31	2E-07	<1	<1
45	RD	AM25	1E-10	<1	<1
45	RD	AM26	--	<1	<1
45	RD	AM27	3E-07	<1	<1
45	RD	AM28	1E-05	<1	<1
45	RD	AM29	1E-05	<1	<1
45	RD	AM30	3E-07	<1	<1
45	RD	AN25	2E-09	<1	<1
45	RD	AN26	1E-07	<1	<1
45	RD	AN27	9E-10	<1	<1
45	RD	AN28	6E-06	<1	<1
45	RD	AN29	6E-08	<1	<1
45	RD	AO27	5E-10	<1	<1
EMI-1	MI	AZ35	3E-07	<1	<1
EMI-1	MI	BA34	5E-06	<1	<1
EMI-1	MI	BA35	1E-07	2E+00	<1
EMI-1	MI	BB32	2E-06	<1	<1
EMI-1	MI	BB33	1E-05	4E+00	3E+00
EMI-1	MI	BB34	5E-06	2E+00	<1
EMI-1	MI	BB35	6E-09	<1	<1
EMI-1	MI	BC32	--	<1	<1
EMI-1	MI	BC33	7E-06	<1	<1
EMI-1	MI	BC34	3E-07	<1	<1
EMI-1	MI	BC35	3E-11	<1	<1
EMI-1	MI	BD31	--	<1	<1
EMI-1	MI	BD32	3E-05	<1	<1
EMI-1	MI	BD33	8E-06	<1	<1
EMI-1	MI	BD34	7E-06	3E+00	2E+00
EMI-1	MI	BE30	1E-07	<1	<1
EMI-1	MI	BE31	7E-06	<1	<1
EMI-1	MI	BE32	8E-06	<1	<1
EMI-1	MI	BE33	5E-06	<1	<1
EMI-1	MI	BE34	1E-05	2E+01	2E+01
EMI-1	MI	BF31	4E-05	3E+00	<1
EMI-1	MI	BF32	2E-08	<1	<1
EMI-1	MI	BF33	2E-07	<1	<1
EMI-1	MI	BF34	5E-07	<1	<1
EMI-1	MI	BG32	2E-06	<1	<1
EMI-1	MI	BG33	1E-06	<1	<1
EMI-1	MI	BG34	1E-05	<1	<1
EMI-1	MI	BH33	2E-07	<1	<1
EMI-1	MI	BH34	6E-09	<1	<1
EMI-1	MI	BI32	1E-08	<1	<1
EMI-1	MI	BI34	5E-05	2E+00	<1
EMI-1	MI	BJ32	5E-07	<1	<1
EMI-1	MI	BJ33	7E-06	2E+00	<1
EMI-1	MI	BK32	2E-06	<1	<1
EOS-1	OS	AL35	1E-05	2E+00	<1
EOS-1	OS	AL36	3E-05	8E+00	3E+00
EOS-1	OS	AL37	8E-07	2E+00	<1
EOS-1	OS	AM36	2E-05	2E+01	1E+01
EOS-1	OS	AM37	3E-05	1E+01	8E+00
EOS-1	OS	AM38	1E-05	3E+00	<1
EOS-1	OS	AN36	2E-06	<1	<1
EOS-1	OS	AN37	1E-04	3E+02	2E+02
EOS-1	OS	AN38	4E-05	1E+01	6E+00
EOS-1	OS	AN39	5E-07	2E+00	<1
EOS-1	OS	AO37	7E-06	<1	<1
EOS-1	OS	AO39	9E-06	7E+00	3E+00

TABLE 5-10: INCREMENTAL RISK - SUMMARY OF CANCER RISKS AND HAZARD INDICES BY PLANNED REUSE, SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	RME Cancer Risk	RME HI	RME Segregated HI
EOS-1	OS	AP38	1E-05	2E+01	1E+01
EOS-1	OS	AQ39	8E-06	<1	<1
EOS-1	OS	AQ40	1E-06	<1	<1
EOS-1	OS	AR39	5E-07	<1	<1
EOS-1	OS	AR40	2E-05	7E+00	6E+00
EOS-1	OS	AS38	2E-05	2E+00	<1
EOS-1	OS	AT38	1E-05	2E+00	<1
EOS-1	OS	AT39	8E-06	<1	<1
EOS-1	OS	AU37	4E-04	7E+02	7E+02
EOS-1	OS	AV37	2E-04	3E+02	3E+02
EOS-1	OS	AW37	4E-07	<1	<1
EOS-2	OS	AX36	1E-05	3E+00	<1
EOS-2	OS	AX37	5E-06	<1	<1
EOS-2	OS	AY36	6E-05	3E+01	2E+01
EOS-2	OS	AY37	1E-05	5E+00	2E+00
EOS-2	OS	AZ36	5E-05	4E+00	2E+00
EOS-2	OS	AZ37	1E-05	3E+00	<1
EOS-2	OS	BA36	4E-05	3E+00	<1
EOS-2	OS	BA37	7E-07	<1	<1
EOS-2	OS	BB36	6E-06	<1	<1
EOS-3	OS	BC36	1E-06	<1	<1
EOS-3	OS	BD35	7E-09	<1	<1
EOS-3	OS	BE35	7E-06	<1	<1
EOS-3	OS	BE36	2E-05	2E+00	<1
EOS-3	OS	BF35	5E-06	<1	<1
EOS-3	OS	BF36	3E-05	<1	<1
EOS-3	OS	BG35	1E-06	<1	<1
EOS-3	OS	BG36	1E-05	2E+00	<1
EOS-3	OS	BG37	4E-05	5E+00	2E+00
EOS-3	OS	BH36	1E-05	1E+01	5E+00
EOS-3	OS	BH37	2E-05	<1	<1
EOS-3	OS	BI35	1E-07	<1	<1
EOS-3	OS	BI36	1E-05	2E+00	<1
EOS-3	OS	BI37	2E-05	7E+00	3E+00
EOS-3	OS	BJ36	2E-05	5E+00	2E+00
EOS-4	OS	AF26	1E-11	<1	<1
EOS-4	OS	AG27	--	<1	<1
EOS-5	OS	ZZ01	1E-05	<1	<1

Notes: Bolded values exceed the threshold level of 1E-06 for cancer risks and 1.0 for segregated noncancer hazards.

<1	Less than 1
--	Not applicable
bgs	Below ground surface
E/C	Educational/cultural (industrial exposure scenario)
HI	Hazard index
IND	Industrial (industrial exposure scenario)
MI	Maritime/industrial (industrial exposure scenario)
MU	Mixed use (residential exposure scenario)
OS	Open space
RD	Research and development
RME	Reasonable maximum exposure

TABLE 5-11: INCREMENTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) BY PLANNED REUSE
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI			
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion
31B/36	IND	AS29	9E-06	<1	<1	PAH	Benzo(a)pyrene	C	1.2 - 1.2	1.20E+00	1/9	6.83E-06	36.8	63.2	0.0	—	—	—	—	—
31B/36	IND	AT29	3E-04	<1	<1	Metal	Arsenic	C	11 - 130	1.30E+02	2/2	3.00E-04	71.6	28.4	0.0	<1	—	—	—	—
						PAH	Benzo(a)pyrene	C	0.24 - 0.24	2.40E-01	1/2	1.37E-06	36.8	63.2	0.0	—	—	—	—	—
31B/36	IND	AU29	2E-04	<1	<1	Metal	Arsenic	C	7.2 - 105	7.88E+01	7/7	1.82E-04	71.6	28.4	0.0	<1	—	—	—	—
							Benzo(a)pyrene	C	0.065 - 0.8	8.00E-01	4/7	4.56E-06	36.8	63.2	0.0	—	—	—	—	—
							Benzo(b)fluoranthene	C	0.23 - 2.1	2.10E+00	4/6	1.20E-06	36.8	63.2	0.0	—	—	—	—	—
31B/36	IND	AV29	1E-04	<1	<1	Metal	Arsenic	C	2.4 - 50.9	5.09E+01	7/8	1.17E-04	71.6	28.4	0.0	<1	—	—	—	—
						VOC	Naphthalene	C	6.6 - 6.6	6.60E+00	1/11	1.42E-06	9.8	0.0	90.2	<1	—	—	—	—
31B/36	IND	AV30	5E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.45 - 0.45	4.50E-01	1/2	2.56E-06	36.8	63.2	0.0	—	—	—	—	—
40	IND	AW31	3E-05	<1	<1	Metal	Arsenic	C	12.3 - 12.3	1.23E+01	1/1	2.84E-05	71.6	28.4	0.0	<1	—	—	—	—
40	IND	BA33	6E-06	<1	<1	Pest/PCB	Aroclor-1254	C	3.4 - 3.4	3.40E+00	1/7	3.38E-06	35.1	64.9	0.0	<1	—	—	—	—
							Aroclor-1260	C	2.8 - 2.8	2.80E+00	1/7	2.79E-06	35.1	64.9	0.0	<1	—	—	—	—
41	IND	BA30	2E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.16 - 0.23	2.30E-01	2/5	1.31E-06	36.8	63.2	0.0	—	—	—	—	—
41	IND	BB30	3E-05	<1	<1	PAH	Benzo(a)pyrene	C	0.055 - 4.8	2.80E+00	4/11	1.60E-05	36.8	63.2	0.0	—	—	—	—	—
							Benzo(b)fluoranthene	C	0.023 - 9.4	9.40E+00	6/11	5.35E-06	36.8	63.2	0.0	—	—	—	—	—
							Benzo(k)fluoranthene	C	0.023 - 2.3	2.30E+00	2/11	1.31E-06	36.8	63.2	0.0	—	—	—	—	—
							Dibenz(a,h)anthracene	C	1 - 1	1.00E+00	1/11	3.46E-06	36.8	63.2	0.0	—	—	—	—	—
							Indeno(1,2,3-cd)pyrene	C	0.032 - 2.8	2.80E+00	2/11	1.59E-06	36.8	63.2	0.0	—	—	—	—	—
43	IND	AO30	5E-06	<1	<1	Pest/PCB	Aroclor-1260	C	0.77 - 6.8	4.12E+00	5/9	4.10E-06	35.1	64.9	0.0	<1	—	—	—	—
43	IND	AP29	2E-04	<1	<1	Metal	Arsenic	C	2.8 - 244	9.09E+01	6/8	2.10E-04	71.6	28.4	0.0	<1	—	—	—	—
						PAH	Benzo(a)pyrene	C	0.038 - 0.21	1.89E-01	4/8	1.08E-06	36.8	63.2	0.0	—	—	—	—	—
43	IND	AP31	2E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.2 - 0.2	2.00E-01	1/3	1.14E-06	36.8	63.2	0.0	—	—	—	—	—
43	IND	AQ30	2E-05	<1	<1	PAH	Benzo(a)pyrene	C	0.068 - 0.37	3.70E-01	3/7	2.11E-06	36.8	63.2	0.0	—	—	—	—	—
						Pest/PCB	Aroclor-1260	C	0.55 - 14	1.40E+01	6/8	1.39E-05	35.1	64.9	0.0	<1	—	—	—	—
43	IND	AR31	3E-05	<1	<1	Metal	Arsenic	C	2.3 - 13	9.13E+00	10/10	2.11E-05	71.6	28.4	0.0	<1	—	—	—	—
						PAH	Benzo(a)pyrene	C	0.039 - 0.19	1.90E-01	2/12	1.08E-06	36.8	63.2	0.0	—	—	—	—	—
						Pest/PCB	Aroclor-1260	C	0.038 - 9	5.82E+00	7/10	5.79E-06	35.1	64.9	0.0	<1	—	—	—	—
43	IND	AR32	3E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.21 - 0.21	2.10E-01	1/18	1.20E-06	36.8	63.2	0.0	—	—	—	—	—
43	IND	AS30	2E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.23 - 0.23	2.30E-01	1/3	1.31E-06	36.8	63.2	0.0	—	—	—	—	—
43	IND	AS32	3E-05	<1	<1	Metal	Arsenic	C	0.81 - 27	1.15E+01	12/14	2.65E-05	71.6	28.4	0.0	<1	—	—	—	—
						PAH	Benzo(a)pyrene	C	0.041 - 0.38	3.80E-01	3/16	2.16E-06	36.8	63.2	0.0	—	—	—	—	—
43	IND	AT32	3E-05	<1	<1	Metal	Arsenic	C	4.4 - 15	1.16E+01	4/5	2.68E-05	71.6	28.4	0.0	<1	—	—	—	—
43	IND	AT33	2E-05	<1	<1	PAH	Benzo(a)pyrene	C	0.16 - 2.4	2.40E+00	3/4	1.37E-05	36.8	63.2	0.0	—	—	—	—	—
43	IND	AU32	3E-06	<1	<1	Pest/PCB	Aroclor-1260	C	0.053 - 2.3	2.30E+00	3/5	2.29E-06	35.1	64.9	0.0	<1	—	—	—	—
43	IND	AU34	3E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.3 - 0.3	3.00E-01	1/4	1.71E-06	36.8	63.2	0.0	—	—	—	—	—
43	IND	AV33	5E-05	<1	<1	PAH	Benzo(a)anthracene	C	0.13 - 8.2	8.20E+00	2/8	4.67E-06	36.8	63.2	0.0	—	—	—	—	—
							Benzo(a)pyrene	C	0.082 - 6.4	6.40E+00	2/8	3.64E-05	36.8	63.2	0.0	—	—	—	—	—
							Benzo(b)fluoranthene	C	0.21 - 13	1.30E+01	3/8	7.40E-06	36.8	63.2	0.0	—	—	—	—	—
							Dibenz(a,h)anthracene	C	1.1 - 1.1	1.10E+00	1/8	3.81E-06	36.8	63.2	0.0	—	—	—	—	—
43	IND	AV34	4E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.32 - 0.36	3.60E-01	2/4	2.05E-06	36.8	63.2	0.0	—	—	—	—	—
43	IND	AW34	2E-05	<1	<1	PAH	Benzo(a)anthracene	C	0.12 - 5.7	5.70E+00	6/9	3.25E-06	36.8	63.2	0.0	—	—	—	—	—
							Benzo(a)pyrene	C	0.16 - 2.2	1.33E+00	6/9	7.56E-06	36.8	63.2	0.0	—	—	—	—	—
							Benzo(b)fluoranthene	C	0.33 - 5.2	3.03E+00	6/9	1.73E-06	36.8	63.2	0.0	—	—	—	—	—
						Pest/PCB	Aroclor-1260	C	0.083 - 1.8	1.80E+00	3/5	1.79E-06	35.1	64.9	0.0	<1	—	—	—	—
44	IND	AL32	7E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.036 - 0.43	4.30E-01	2/3	2.45E-06	36.8	63.2	0.0	—	—	—	—	—
						Pest/PCB	Aroclor-1260	C	0.36 - 3.6	3.60E+00	2/3	3.58E-06	35.1	64.9	0.0	<1	—	—	—	—
44	IND	AM32	6E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.043 - 0.53	3.76E-01	4/5	2.14E-06	36.8	63.2	0.0	—	—	—	—	—
44	IND	AM33	1E-05	<1	<1	PAH	Benzo(a)pyrene	C	0.049 - 0.64	6.40E-01	2/3	3.64E-06	36.8	63.2	0.0	—	—	—	—	—
							Benzo(b)fluoranthene	C	0.11 - 1.8	1.80E+00	3/3	1.03E-06	36.8	63.2	0.0	—	—	—	—	—
						Pest/PCB	Aroclor-1260	C	0.33 - 3.9	3.90E+00	2/3	3.88E-06	35.1	64.9	0.0	<1	—	—	—	—

TABLE 5-11: INCREMENTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	
44	IND	AM34	1E-05	<1	<1	PAH	Benzo(a)pyrene	C	0.75 - 0.75	7.50E-01	1/3	4.27E-06	36.8	63.2	0.0	—	—	—	—		
44	IND	AM35	8E-05	<1	<1	Pest/PCB	Aroclor-1254	C	1.6 - 1.6	1.60E+00	1/3	1.59E-06	35.1	64.9	0.0	<1	—	—	—		
						Aroclor-1260	C	5.3 - 5.3	5.30E+00	1/3	5.28E-06	35.1	64.9	0.0	<1	—	—	—			
						Metal	Arsenic	C	3.6 - 23	2.30E+01	3/7	5.30E-05	71.6	28.4	0.0	<1	—	—	—		
						PAH	Benzo(a)anthracene	C	0.052 - 2.3	2.30E+00	6/8	1.31E-06	36.8	63.2	0.0	—	—	—			
						Benzo(a)pyrene	C	0.051 - 3.5	3.50E+00	6/8	1.99E-05	36.8	63.2	0.0	—	—	—				
						Benzo(b)fluoranthene	C	0.1 - 6.1	6.10E+00	6/8	3.47E-06	36.8	63.2	0.0	—	—	—				
						Dibenz(a,h)anthracene	C	0.071 - 0.81	8.10E-01	3/8	2.81E-06	36.8	63.2	0.0	—	—	—				
44	IND	AN33	1E-05	<1	<1	PAH	Benzo(a)pyrene	C	0.23 - 2.3	2.30E+00	4/8	1.31E-06	36.8	63.2	0.0	—	—	—			
						Benzo(a)pyrene	C	0.19 - 1	1.00E+00	2/6	5.70E-06	36.8	63.2	0.0	—	—	—				
44	IND	AP37	7E-06	<1	<1	Pest/PCB	Aroclor-1260	C	1.6 - 1.6	1.60E+00	1/6	1.59E-06	35.1	64.9	0.0	<1	—	—	—		
						Aroclor-1254	C	1.3 - 1.3	1.30E+00	1/5	1.29E-06	35.1	64.9	0.0	<1	—	—	—			
						Aroclor-1260	C	0.044 - 4.3	4.30E+00	3/5	4.28E-06	35.1	64.9	0.0	<1	—	—	—			
44	IND	AQ35	4E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.38 - 0.38	3.80E-01	1/4	2.16E-06	36.8	63.2	0.0	—	—	—			
44	IND	AQ36	3E-05	<1	<1	Metal	Arsenic	C	2.6 - 16	1.15E+01	5/7	2.64E-05	71.6	28.4	0.0	<1	—	—	—		
44	IND	AR35	2E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.23 - 0.23	2.30E-01	1/1	1.31E-06	36.8	63.2	0.0	—	—	—	—		
44	IND	AR36	3E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.22 - 0.22	2.20E-01	1/4	1.25E-06	36.8	63.2	0.0	—	—	—	—		
44	IND	AV36	3E-05	<1	<1	Metal	Arsenic	C	9.2 - 15	1.50E+01	5/5	3.46E-05	71.6	28.4	0.0	<1	—	—	—		
44	IND	AW36	2E-06	<1	<1	—	No COCs Identified	—	—	—	—	—	—	—	—	—	—	—	—		
44	IND	AY35	3E-05	<1	<1	Metal	Arsenic	C	11.9 - 11.9	1.19E+01	1/1	2.74E-05	71.6	28.4	0.0	<1	—	—	—		
45	RD	033077	—	8E+00	7E+00	Metal	Manganese	NC	6040 - 6040	6.04E+03	1/1	—	—	—	—	7.16E+00	44.9	0.0	2.9	52.2	
45	RD	035079	4E-04	<1	<1	Metal	Arsenic	C/NC	16.5 - 16.5	1.65E+01	1/1	4.31E-04	56.6	5.4	0.0	38.0	1.05E+00	66.8	5.6	0.1	27.5
45	RD	036074	—	9E+00	3E+00	Metal	Iron	NC	64100 - 64100	6.41E+04	1/1	—	—	—	—	2.92E+00	93.6	0.0	0.0	6.4	
						Manganese	NC	1560 - 1560	1.56E+03	1/1	—	—	—	—	1.85E+00	44.9	0.0	2.9	52.2		
						Vanadium	NC	191 - 191	1.91E+02	1/1	—	—	—	—	2.95E+00	82.9	0.0	0.0	17.1		
						Manganese	NC	2840 - 2840	2.84E+03	1/1	—	—	—	—	3.37E+00	44.9	0.0	2.9	52.2		
45	RD	038074	2E-07	4E+00	3E+00	Metal	Iron	NC	59200 - 59200	5.92E+04	1/1	—	—	—	—	2.70E+00	93.6	0.0	0.0	6.4	
45	RD	038079	6E-04	2E+01	2E+01	Metal	Thallium	NC	5.7 - 5.7	5.70E+00	1/1	—	—	—	—	1.13E+00	97.3	0.0	0.0	2.7	
						Antimony	NC	38.4 - 38.4	3.84E+01	1/2	—	—	—	—	3.76E+00	32.7	0.0	0.0	67.3		
						Arsenic	C/NC	10.7 - 21.8	2.18E+01	2/2	5.69E-04	56.6	5.4	0.0	38.0	1.39E+00	66.8	5.6	0.1	27.5	
						Cadmium	NC	8.2 - 8.2	8.20E+00	1/2	1.39E-08	—	—	—	—	2.37E+00	8.8	0.0	0.0	91.1	
						Copper	NC	33.7 - 165	1.65E+02	2/2	—	—	—	—	1.04E+00	5.5	0.0	0.0	94.5		
						Lead	—	142 - 504	5.04E+02	2/2	—	—	—	—	—	—	—	—	—		
						Zinc	NC	49.1 - 5400	5.40E+03	2/2	—	—	—	—	1.45E+01	1.6	0.0	0.0	98.4		
						PAH	Benzo(a)anthracene	C	0.55 - 0.55	5.50E-01	1/2	1.49E-06	69.5	28.5	0.0	2.0	—	—	—	—	
						Benzo(a)pyrene	C	0.76 - 0.76	7.60E-01	1/2	2.04E-05	70.1	28.8	0.0	1.1	—	—	—	—		
						Benzo(b)fluoranthene	C	1.2 - 1.2	1.20E+00	1/2	3.55E-06	63.6	26.1	0.0	10.3	—	—	—	—		
Pest/PCB	Aroclor-1260	C	0.58 - 0.58	5.80E-01	1/2	2.75E-06	66.1	29.2	0.0	4.7	<1	—	—	—	—						
SVOC	Bis(2-ethylhexyl)phthalate	C	5.4 - 5.4	5.40E+00	1/2	4.73E-06	2.5	0.8	0.0	96.7	<1	—	—	—	—						
45	RD	040075	—	5E+00	5E+00	Metal	Manganese	NC	4390 - 4390	4.39E+03	1/1	—	—	—	—	5.21E+00	44.9	0.0	2.9	52.2	
45	RD	041082	4E-05	<1	<1	PAH	Benzo(a)anthracene	C	0.59 - 0.59	5.90E-01	1/1	1.60E-06	69.5	28.5	0.0	2.0	—	—	—	—	
						Benzo(a)pyrene	C	0.94 - 0.94	9.40E-01	1/1	2.52E-05	70.1	28.8	0.0	1.1	—	—	—	—		
						Benzo(b)fluoranthene	C	1.2 - 1.2	1.20E+00	1/1	3.55E-06	63.6	26.1	0.0	10.3	—	—	—	—		
						Benzo(k)fluoranthene	C	0.47 - 0.47	4.70E-01	1/1	1.39E-06	63.6	26.1	0.0	10.3	—	—	—	—		
						Indeno(1,2,3-cd)pyrene	C	0.6 - 0.6	6.00E-01	1/1	1.73E-06	65.3	26.8	0.0	8.0	—	—	—	—		
						Pest/PCB	Dieldrin	C	0.005 - 0.005	5.00E-03	1/1	7.58E-06	1.7	0.5	0.0	97.8	<1	—	—	—	—
45	RD	042073	—	5E+00	3E+00	Metal	Manganese	NC	843 - 2530	2.53E+03	2/2	—	—	—	—	3.00E+00	44.9	0.0	2.9	52.2	
						Thallium	NC	7.1 - 7.1	7.10E+00	1/2	—	—	—	—	1.41E+00	97.3	0.0	0.0	2.7		
45	RD	042081	4E-04	<1	<1	Metal	Arsenic	C/NC	16.3 - 16.3	1.63E+01	1/2	4.26E-04	56.6	5.4	0.0	38.0	1.04E+00	66.8	5.6	0.1	27.5
45	RD	042082	4E-05	9E+00	5E+00	Metal	Antimony	NC	11.9 - 11.9	1.19E+01	1/1	—	—	—	—	1.16E+00	32.7	0.0	0.0	67.3	
						Copper	NC	771 - 771	7.71E+02	1/1	—	—	—	—	4.84E+00	5.5	0.0	0.0	94.5		
						Lead	—	321 - 321	3.21E+02	1/1	—	—	—	—	—	—	—	—	—		
						Zinc	NC	794 - 794	7.94E+02	1/1	—	—	—	—	2.13E+00	1.6	0.0	0.0	98.4		

TABLE 5-11: INCREMENTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI			
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion
45	RD	042082	4E-05	9E+00	5E+00	PAH	Benzo(a)anthracene	C	1.3 - 1.3	1.30E+00	1/1	3.51E-06	69.5	28.5	0.0	2.0	--	--	--	--
							Benzo(a)pyrene	C	0.79 - 0.79	7.90E-01	1/1	2.12E-05	70.1	28.8	0.0	1.1	--	--	--	--
							Benzo(b)fluoranthene	C	2.5 - 2.5	2.50E+00	1/1	7.39E-06	63.6	26.1	0.0	10.3	--	--	--	--
							Benzo(k)fluoranthene	C	0.75 - 0.75	7.50E-01	1/1	2.22E-06	63.6	26.1	0.0	10.3	--	--	--	--
							Dibenz(a,h)anthracene	C	0.14 - 0.14	1.40E-01	1/1	2.42E-06	66.2	27.2	0.0	6.7	--	--	--	--
							Indeno(1,2,3-cd)pyrene	C	0.45 - 0.45	4.50E-01	1/1	1.30E-06	65.3	26.8	0.0	8.0	--	--	--	--
						Pest/PCB	Aroclor-1260	C	0.82 - 0.82	8.20E-01	1/1	3.89E-06	66.1	29.2	0.0	4.7	<1	--	--	--
45	RD	043081	5E-04	<1	<1	Metal	Arsenic	C/NC	17.9 - 17.9	1.79E+01	1/2	4.68E-04	56.6	5.4	0.0	38.0	1.14E+00	66.8	5.6	0.1
45	RD	044073	--	<1	<1	Metal	Thallium	NC	5.6 - 5.6	5.60E+00	1/1	--	--	--	--	1.11E+00	97.3	0.0	0.0	
45	RD	044079	4E-04	4E+00	3E+00	Metal	Arsenic	C	14.3 - 14.3	1.43E+01	1/2	3.74E-04	56.6	5.4	0.0	38.0	<1	--	--	--
							Manganese	NC	994 - 2440	2.44E+03	2/2	--	--	--	--	2.89E+00	44.9	0.0	2.9	
45	RD	045074	1E-05	4E+00	3E+00	Metal	Manganese	NC	925 - 2630	2.63E+03	2/2	--	--	--	--	3.12E+00	44.9	0.0	2.9	
						PAH	Benzo(a)pyrene	C	0.22 - 0.22	2.20E-01	1/2	5.90E-06	70.1	28.8	0.0	1.1	--	--	--	--
							Benzo(b)fluoranthene	C	0.54 - 0.54	5.40E-01	1/2	1.60E-06	63.6	26.1	0.0	10.3	--	--	--	--
							Benzo(k)fluoranthene	C	0.56 - 0.56	5.60E-01	1/2	1.66E-06	63.6	26.1	0.0	10.3	--	--	--	--
							Indeno(1,2,3-cd)pyrene	C	0.41 - 0.41	4.10E-01	1/2	1.18E-06	65.3	26.8	0.0	8.0	--	--	--	--
45	RD	045075	2E-08	4E+00	3E+00	Metal	Copper	NC	170 - 170	1.70E+02	1/1	--	--	--	--	1.07E+00	5.5	0.0	0.0	
							Manganese	NC	2500 - 2500	2.50E+03	1/1	--	--	--	--	2.97E+00	44.9	0.0	2.9	
45	RD	046072	4E-08	2E+00	<1	Metal	Thallium	NC	7.1 - 7.1	7.10E+00	1/1	--	--	--	--	1.41E+00	97.3	0.0	0.0	
45	RD	046074	3E-06	2E+01	1E+01	Metal	Copper	NC	536 - 536	5.36E+02	1/1	--	--	--	--	3.37E+00	5.5	0.0	0.0	
							Mercury	NC	17.5 - 17.5	1.75E+01	1/1	--	--	--	--	1.10E+01	6.8	0.0	0.0	
							Zinc	NC	567 - 567	5.67E+02	1/1	--	--	--	--	1.52E+00	1.6	0.0	0.0	
						PAH	Benzo(a)pyrene	C	0.04 - 0.04	4.00E-02	1/1	1.07E-06	70.1	28.8	0.0	1.1	--	--	--	--
45	RD	046082	8E-06	5E+01	3E+01	Metal	Antimony	NC	22.3 - 22.3	2.23E+01	1/1	--	--	--	--	2.18E+00	32.7	0.0	0.0	
							Copper	NC	5230 - 5230	5.23E+03	1/1	--	--	--	--	3.29E+01	5.5	0.0	0.0	
							Lead	--	4850 - 4850	4.85E+03	1/1	--	--	--	--	--	--	--	--	
							Mercury	NC	3.7 - 3.7	3.70E+00	1/1	--	--	--	--	2.33E+00	6.8	0.0	0.0	
							Zinc	NC	2220 - 2220	2.22E+03	1/1	--	--	--	--	5.95E+00	1.6	0.0	0.0	
						Pest/PCB	Aroclor-1260	C/NC	1.4 - 1.4	1.40E+00	1/1	6.63E-06	66.1	29.2	0.0	4.7	1.29E+00	69.6	27.3	
45	RD	047089	4E-06	3E+00	<1	Metal	Copper	NC	188 - 188	1.88E+02	1/1	--	--	--	--	1.18E+00	5.5	0.0	0.0	
							Lead	--	1080 - 1080	1.08E+03	1/1	--	--	--	--	--	--	--	--	
							Zinc	NC	401 - 401	4.01E+02	1/1	--	--	--	--	1.07E+00	1.6	0.0	0.0	
						Pest/PCB	Aroclor-1260	C	0.75 - 0.75	7.50E-01	1/1	3.55E-06	66.1	29.2	0.0	4.7	<1	--	--	
45	RD	047092	4E-09	<1	<1	Metal	Lead	--	187 - 187	1.87E+02	1/1	--	--	--	--	--	--	--	--	
45	RD	048072	1E-05	3E+00	3E+00	Metal	Iron	NC	12200 - 61100	6.11E+04	2/2	--	--	--	--	2.78E+00	93.6	0.0	0.0	
						PAH	Benzo(a)pyrene	C	0.46 - 0.46	4.60E-01	1/2	1.23E-05	70.1	28.8	0.0	1.1	--	--	--	--
45	RD	048080	7E-06	7E+01	7E+01	Metal	Antimony	NC	29 - 29	2.90E+01	1/1	--	--	--	--	2.84E+00	32.7	0.0	0.0	
							Copper	NC	10400 - 10400	1.04E+04	1/1	--	--	--	--	6.53E+01	5.5	0.0	0.0	
							Lead	--	1900 - 1900	1.90E+03	1/1	--	--	--	--	--	--	--	--	
							Zinc	NC	784 - 784	7.84E+02	1/1	--	--	--	--	2.10E+00	1.6	0.0	0.0	
						Pest/PCB	Aroclor-1260	C/NC	1.4 - 1.4	1.40E+00	1/1	6.63E-06	66.1	29.2	0.0	4.7	1.29E+00	69.6	27.3	
45	RD	049079	2E-05	9E+00	4E+00	Metal	Cadmium	NC	4 - 4	4.00E+00	1/1	6.78E-09	--	--	--	--	1.16E+00	8.8	0.0	
							Copper	NC	619 - 619	6.19E+02	1/1	--	--	--	--	3.89E+00	5.5	0.0	0.0	
							Lead	--	1070 - 1070	1.07E+03	1/1	--	--	--	--	--	--	--	--	
						Pest/PCB	Aroclor-1260	C/NC	3.3 - 3.3	3.30E+00	1/1	1.56E-05	66.1	29.2	0.0	4.7	3.03E+00	69.6	27.3	
45	RD	050077	5E-06	3E+00	2E+00	Metal	Vanadium	NC	121 - 121	1.21E+02	1/1	--	--	--	--	1.87E+00	82.9	0.0	0.0	
						Pest/PCB	Aroclor-1260	C/NC	1.1 - 1.1	1.10E+00	1/1	5.21E-06	66.1	29.2	0.0	4.7	1.01E+00	69.6	27.3	
45	RD	050083	--	2E+00	2E+00	Metal	Mercury	NC	2.3 - 2.3	2.30E+00	1/1	--	--	--	--	1.45E+00	6.8	0.0	0.0	
45	RD	050086	5E-06	<1	<1	SVOC	Pentachloropheno	C	10 - 10	1.00E+01	1/1	3.85E-06	48.8	38.5	0.0	12.6	<1	--	--	
45	RD	052085	4E-08	2E+00	2E+00	Metal	Manganese	NC	1590 - 1590	1.59E+03	1/1	--	--	--	--	1.89E+00	44.9	0.0	2.9	
45	RD	053081	2E-08	3E+00	3E+00	Metal	Cadmium	NC	11.3 - 11.3	1.13E+01	1/1	1.92E-08	--	--	--	--	3.27E+00	8.8	0.0	
45	RD	053085	4E-06	<1	<1	Metal	Lead	--	12.5 - 169	1.69E+02	2/2	--	--	--	--	--	--	--	--	
						SVOC	Bis(2-ethylhexyl)phthalate	C	3.6 - 3.6	3.60E+00	1/2	3.15E-06	2.5	0.8	0.0	96.7	<1	--	--	
45	RD	054074	2E-06	2E+00	<1	Metal	Lead	--	597 - 597	5.97E+02	1/1	--	--	--	--	--	--	--	--	
						Pest/PCB	Aroclor-1260	C	0.32 - 0.32	3.20E-01	1/1	1.52E-06	66.1	29.2	0.0	4.7	<1	--	--	

TABLE 5-11: INCREMENTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

													Percent Contribution by Exposure Pathway to Total RME Cancer Risk					Percent Contribution by Exposure Pathway to Total RME HI			
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Chemical-Specific HI	Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)
Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	Chemical-Specific HI	Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion
45	RD	054077	–	2E+00	<1	Metal	Thallium	NC	6.8 - 6.8	6.80E+00	1/1	–	–	–	–	–	1.35E+00	97.3	0.0	0.0	2.7
45	RD	054081	8E-08	2E+00	2E+00	Metal	Manganese	NC	1890 - 1890	1.89E+03	1/1	–	–	–	–	–	2.24E+00	44.9	0.0	2.9	52.2
EMI-1	MI	BA34	4E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.052 - 0.46	4.60E-01	3/10	2.62E-06	36.8	63.2	0.0		–	–	–	–	
EMI-1	MI	BB32	6E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.043 - 0.6	6.00E-01	2/6	3.42E-06	36.8	63.2	0.0		–	–	–	–	
EMI-1	MI	BB33	1E-05	<1	<1	Pest/PCB	Aroclor-1260	C	0.019 - 1.5	1.50E+00	3/6	1.49E-06	35.1	64.9	0.0		<1	–	–	–	
						PAH	Benzo(a)pyrene	C	0.13 - 0.38	3.80E-01	2/11	2.16E-06	36.8	63.2	0.0		–	–	–		
EMI-1	MI	BB34	3E-05	<1	<1	Pest/PCB	Aroclor-1254	C	6.9 - 6.9	6.90E+00	1/11	6.87E-06	35.1	64.9	0.0		<1	–	–	–	
						Metal	Arsenic	C	3.4 - 14.5	8.89E+00	6/14	2.05E-05	71.6	28.4	0.0		<1	–	–	–	
EMI-1	MI	BB34	3E-05	<1	<1	PAH	Benzo(a)pyrene	C	0.014 - 0.31	3.10E-01	8/16	1.77E-06	36.8	63.2	0.0		–	–	–	–	
						Pest/PCB	Aroclor-1260	C	0.02 - 1.6	1.60E+00	3/9	1.59E-06	35.1	64.9	0.0		<1	–	–	–	
EMI-1	MI	BC33	2E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.068 - 0.29	2.90E-01	2/14	1.65E-06	36.8	63.2	0.0		–	–	–	–	
EMI-1	MI	BD32	3E-05	<1	<1	Metal	Arsenic	C	3.5 - 12	1.20E+01	3/5	2.77E-05	71.6	28.4	0.0		<1	–	–	–	
EMI-1	MI	BD33	6E-05	<1	<1	Metal	Arsenic	C	3.5 - 62	2.54E+01	12/12	5.87E-05	71.6	28.4	0.0		<1	–	–	–	
						Lead	–	–	5.5 - 1420	1.42E+03	11/13	–	–	–	–	–	–	–	–	–	–
EMI-1	MI	BD34	2E-05	<1	<1	Metal	Arsenic	C	0.84 - 14.5	8.32E+00	7/9	1.92E-05	71.6	28.4	0.0		<1	–	–	–	
						Pest/PCB	Aroclor-1254	C	0.46 - 3.3	3.30E+00	2/6	3.28E-06	35.1	64.9	0.0		<1	–	–	–	
EMI-1	MI	BE31	3E-05	<1	<1	Metal	Arsenic	C	7.9 - 12	1.20E+01	2/2	2.77E-05	71.6	28.4	0.0		<1	–	–	–	
EMI-1	MI	BE32	7E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.096 - 0.85	8.50E-01	2/6	4.84E-06	36.8	63.2	0.0		–	–	–	–	
EMI-1	MI	BE34	5E-05	3E+00	3E+00	Metal	Arsenic	C	2.5 - 11.8	6.93E+00	7/11	1.60E-05	71.6	28.4	0.0		<1	–	–	–	
						Pest/PCB	Aroclor-1254	C/NC	30 - 38	3.80E+01	2/11	3.78E-05	35.1	64.9	0.0		2.65E+00	35.1	64.9	0.0	
EMI-1	MI	BF31	1E-04	<1	<1	Metal	Arsenic	C	4.4 - 45	4.50E+01	3/3	1.04E-04	71.6	28.4	0.0		<1	–	–	–	
						Lead	–	–	35.6 - 4300	4.30E+03	3/3	–	–	–	–	–	–	–	–	–	–
EMI-1	MI	BG32	6E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.27 - 0.7	7.00E-01	2/4	3.99E-06	36.8	63.2	0.0		–	–	–	–	
EMI-1	MI	BG33	8E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.45 - 0.99	9.90E-01	3/20	5.64E-06	36.8	63.2	0.0		–	–	–	–	
EMI-1	MI	BG34	4E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.066 - 0.4	4.00E-01	2/4	2.28E-06	36.8	63.2	0.0		–	–	–	–	
EMI-1	MI	BI34	2E-04	<1	<1	Metal	Arsenic	C	3.6 - 99.5	9.95E+01	2/5	2.29E-04	71.6	28.4	0.0		<1	–	–	–	
						Lead	–	–	8.7 - 1340	1.34E+03	3/5	–	–	–	–	–	–	–	–	–	–
EMI-1	MI	BJ33	3E-05	<1	<1	PAH	Benzo(a)pyrene	C	0.21 - 0.21	2.10E-01	1/4	1.20E-06	36.8	63.2	0.0		–	–	–	–	
						Metal	Arsenic	C	12.1 - 12.1	1.21E+01	1/1	2.79E-05	71.6	28.4	0.0		<1	–	–	–	–
EOS-1	OS	AL35	3E-05	<1	<1	Metal	Arsenic	C	6.9 - 12	1.20E+01	2/2	3.23E-05	62.8	37.2	0.0		<1	–	–	–	
						PAH	Benzo(a)pyrene	C	0.17 - 0.17	1.70E-01	1/2	1.30E-06	28.0	71.9	0.0		–	–	–	–	
EOS-1	OS	AL36	1E-04	3E+00	<1	Metal	Arsenic	C	2.9 - 31	3.10E+01	2/5	8.34E-05	62.8	37.2	0.0		<1	–	–	–	
						Lead	–	–	28 - 470	4.13E+02	5/5	–	–	–	–	–	–	–	–	–	
EOS-1	OS	AL36	1E-04	3E+00	<1	PAH	Benzo(a)anthracene	C	2.7 - 2.7	2.70E+00	1/5	2.07E-06	28.0	71.9	0.0		–	–	–	–	
							Benzo(a)pyrene	C	0.25 - 2.5	2.50E+00	2/5	1.91E-05	28.0	71.9	0.0		–	–	–	–	–
EOS-1	OS	AL36	1E-04	3E+00	<1	Benzo(b)fluoranthene	C	0.085 - 3.5	3.50E+00	2/5	2.68E-06	28.0	71.9	0.0		–	–	–	–		
							Benzo(k)fluoranthene	C	1.7 - 1.7	1.70E+00	1/5	1.30E-06	28.0	71.9	0.0		–	–	–	–	–
EOS-1	OS	AL36	1E-04	3E+00	<1	Indeno(1,2,3-cd)pyrene	C	0.17 - 1.4	1.40E+00	2/5	1.07E-06	28.0	71.9	0.0		–	–	–	–		
							Pest/PCB	Aroclor-1260	C/NC	0.13 - 5.5	5.50E+00	4/5	7.40E-06	26.6	73.4	0.0		1.39E+00	29.0	71.0	0.0
EOS-1	OS	AM36	1E-04	1E+01	1E+01	Metal	Arsenic	C	8.4 - 18	1.80E+01	3/6	4.85E-05	62.8	37.2	0.0		<1	–	–	–	
						Lead	–	–	38 - 700	5.72E+02	5/6	–	–	–	–	–	–	–	–	–	
EOS-1	OS	AM36	1E-04	1E+01	1E+01	PAH	Benzo(a)pyrene	C	0.045 - 0.15	1.50E-01	2/6	1.15E-06	28.0	71.9	0.0		–	–	–	–	
						Pest/PCB	Aroclor-1260	C/NC	0.15 - 40	4.00E+01	3/6	5.39E-05	26.6	73.4	0.0		1.01E+01	29.0	71.0	0.0	
EOS-1	OS	AM37	1E-04	5E+00	3E+00	Metal	Arsenic	C	6.2 - 12	1.20E+01	3/4	3.23E-05	62.8	37.2	0.0		<1	–	–	–	
						Lead	–	–	270 - 871	8.65E+02	4/4	–	–	–	–	–	–	–	–	–	
EOS-1	OS	AM37	1E-04	5E+00	3E+00	PAH	Benzo(a)anthracene	C	0.52 - 20	2.00E+01	3/4	1.53E-05	28.0	71.9	0.0		–	–	–	–	
							Benzo(a)pyrene	C	0.1 - 3.5	3.50E+00	3/4	2.68E-05	28.0	71.9	0.0		–	–	–	–	–
EOS-1	OS	AM37	1E-04	5E+00	3E+00	Benzo(b)fluoranthene	C	0.15 - 6.5	6.50E+00	3/4	4.98E-06	28.0	71.9	0.0		–	–	–	–		
							Chrysene	C	0.58 - 20	2.00E+01	3/4	1.53E-06	28.0	71.9	0.0		–	–	–	–	–
EOS-1	OS	AM37	1E-04	5E+00	3E+00	Dibenz(a,h)anthracene	C	0.61 - 0.61	6.10E-01	1/4	2.84E-06	28.0	71.9	0.0		–	–	–	–		
							Indeno(1,2,3-cd)pyrene	C	0.38 - 2.3	2.30E+00	2/4	1.76E-06	28.0	71.9	0.0		–	–	–	–	–
EOS-1	OS	AM37	1E-04	5E+00	3E+00	Pest/PCB	Aroclor-1260	C/NC	0.074 - 12	1.20E+01	4/4	1.62E-05	26.6	73.4	0.0		3.02E+00	29.0	71.0	0.0	

TABLE 5-11: INCREMENTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	
EOS-1	OS	AM38	6E-05	2E+00	<1	Metal	Arsenic	C	5.2 - 19.2	1.92E+01	2/3	5.17E-05	62.8	37.2	0.0		<1	--	--	--	
							Lead	--	19.2 - 1180	1.18E+03	3/3	--	--	--	--		--	--	--		
						PAH	Benzo(a)pyrene	C	0.33 - 0.33	3.30E-01	1/3	2.53E-06	28.0	71.9	0.0		--	--	--		
EOS-1	OS	AN37	2E-05	2E+00	2E+00	Pest/PCB	Aroclor-1260	C	0.5 - 1.3	1.30E+00	2/3	1.75E-06	26.6	73.4	0.0		<1	--	--	--	
						Metal	Lead	--	509 - 4810	4.81E+03	3/3	--	--	--	--		--	--	--		
						PAH	Benzo(a)pyrene	C	0.17 - 0.86	8.60E-01	3/4	6.58E-06	28.0	71.9	0.0		--	--	--		
EOS-1	OS	AN38	1E-04	4E+00	3E+00		Benzo(b)fluoranthene	C	0.41 - 1.5	1.50E+00	3/4	1.15E-06	28.0	71.9	0.0		--	--	--		
						Pest/PCB	Aroclor-1260	C/NC	0.7 - 6.4	5.61E+00	4/4	7.56E-06	26.6	73.4	0.0		1.41E+00	29.0	71.0	0.0	
						Metal	Arsenic	C	2 - 29.5	2.08E+01	11/11	5.61E-05	62.8	37.2	0.0		<1	--	--	--	
EOS-1	OS	AN39	3E-06	<1	<1		Lead	--	740 - 4130	2.71E+03	11/11	--	--	--	--		--	--	--		
						PAH	Benzo(a)anthracene	C	0.079 - 11	6.74E+00	7/11	5.16E-06	28.0	71.9	0.0		--	--	--		
							Benzo(a)pyrene	C	0.064 - 6.5	4.15E+00	8/11	3.18E-05	28.0	71.9	0.0		--	--	--		
EOS-1	OS	AO37	7E-10	<1	<1		Benzo(b)fluoranthene	C	0.13 - 21	8.36E+00	9/11	6.40E-06	28.0	71.9	0.0		--	--	--		
							Benzo(k)fluoranthene	C	0.045 - 20	1.47E+01	8/11	1.12E-05	28.0	71.9	0.0		--	--	--		
							Chrysene	C	0.081 - 19	1.33E+01	8/11	1.02E-06	28.0	71.9	0.0		--	--	--		
EOS-1	OS	AQ40	7E-06	<1	<1		Dibenz(a,h)anthracene	C	0.049 - 1.7	1.70E+00	6/11	7.92E-06	28.0	71.9	0.0		--	--	--		
							Indeno(1,2,3-cd)pyrene	C	0.045 - 3.3	3.13E+00	8/11	2.40E-06	28.0	71.9	0.0		--	--	--		
						Pest/PCB	Aroclor-1260	C/NC	0.44 - 4.8	4.07E+00	5/5	5.47E-06	26.6	73.4	0.0		1.02E+00	29.0	71.0	0.0	
EOS-1	OS	AR39	2E-06	<1	<1		PCB-105	C	0.015 - 0.12	1.20E-01	2/6	1.21E-06	26.6	73.4	0.0		--	--	--		
							PCB-118	C	0.012 - 0.22	2.20E-01	5/6	2.22E-06	26.6	73.4	0.0		--	--	--		
							PCB-187	C	0.024 - 1	1.00E+00	6/6	1.35E-06	26.6	73.4	0.0		<1	--	--	--	
EOS-1	OS	AR40	2E-04	1E+01	1E+01		PCB-206	C	0.004 - 1.2	1.20E+00	5/6	1.62E-06	26.6	73.4	0.0		<1	--	--	--	
						Metal	Lead	--	275 - 875	8.75E+02	2/2	--	--	--	--		--	--	--		
						Pest/PCB	Aroclor-1260	C	1.5 - 1.8	1.80E+00	2/2	2.42E-06	26.6	73.4	0.0		<1	--	--	--	
EOS-1	OS	AS38	2E-04	<1	<1		Lead	--	618 - 618	6.18E+02	1/1	--	--	--	--		--	--	--		
						Metal	Lead	--	12.6 - 232	2.32E+02	2/2	--	--	--	--		--	--	--		
						Pest/PCB	Aroclor-1260	C	0.055 - 1.3	1.30E+00	2/2	1.75E-06	26.6	73.4	0.0		<1	--	--	--	
EOS-1	OS	AT38	6E-06	<1	<1		Lead	--	92 - 200	2.00E+02	2/2	--	--	--	--		--	--	--		
						PAH	Benzo(a)pyrene	C	0.33 - 0.33	3.30E-01	1/1	2.53E-06	28.0	71.9	0.0		--	--	--		
							Dibenz(a,h)anthracene	C	0.22 - 0.22	2.20E-01	1/1	1.02E-06	28.0	71.9	0.0		--	--	--		
EOS-1	OS	AT39	3E-05	<1	<1		Aroclor-1260	C	0.25 - 1.7	1.70E+00	2/2	2.29E-06	26.6	73.4	0.0		<1	--	--	--	
						Metal	Lead	--	17 - 260	2.60E+02	5/8	--	--	--	--		--	--	--		
						PAH	Benzo(a)pyrene	C	0.035 - 0.21	2.10E-01	3/12	1.61E-06	28.0	71.9	0.0		--	--	--		
EOS-1	OS	AU37	9E-03	2E+03	2E+03	Metal	Arsenic	C	2 - 85.3	3.20E+01	10/11	8.61E-05	62.8	37.2	0.0		<1	--	--	--	
							Lead	--	7 - 968	9.68E+02	10/11	--	--	--	--		--	--	--		
						PAH	Benzo(a)pyrene	C	0.1 - 3.1	3.10E+00	3/10	2.37E-05	28.0	71.9	0.0		--	--	--		
EOS-1	OS	AT38	6E-06	<1	<1		Benzo(b)fluoranthene	C	0.042 - 7.7	4.86E+00	5/10	3.72E-06	28.0	71.9	0.0		--	--	--		
							Benzo(k)fluoranthene	C	0.034 - 2	2.00E+00	3/10	1.53E-06	28.0	71.9	0.0		--	--	--		
							Dibenz(a,h)anthracene	C	0.069 - 0.57	5.70E-01	2/10	2.65E-06	28.0	71.9	0.0		--	--	--		
EOS-1	OS	AT39	3E-05	<1	<1		Indeno(1,2,3-cd)pyrene	C	0.048 - 2.5	2.50E+00	3/10	1.91E-06	28.0	71.9	0.0		--	--	--		
						Pest/PCB	Aroclor-1260	C/NC	0.038 - 45	4.50E+01	8/11	6.06E-05	26.6	73.4	0.0		1.13E+01	29.0	71.0	0.0	
						Metal	Arsenic	C	11 - 56.1	5.18E+01	4/4	1.39E-04	62.8	37.2	0.0		<1	--	--	--	
EOS-1	OS	AU37	9E-03	2E+03	2E+03		Lead	--	1440 - 1440	1.44E+03	1/4	--	--	--	--		--	--	--		
						PAH	Benzo(a)anthracene	C	0.1 - 1.4	1.40E+00	3/4	1.07E-06	28.0	71.9	0.0		--	--	--		
							Benzo(a)pyrene	C	0.13 - 2	2.00E+00	4/4	1.53E-05	28.0	71.9	0.0		--	--	--		
EOS-1	OS	AT38	6E-06	<1	<1		Benzo(b)fluoranthene	C	0.26 - 3.7	3.70E+00	3/4	2.83E-06	28.0	71.9	0.0		--	--	--		
							Dibenz(a,h)anthracene	C	0.44 - 0.44	4.40E-01	1/4	2.05E-06	28.0	71.9	0.0		--	--	--		
						Metal	Lead	--	26 - 230	1.93E+02	5/6	--	--	--	--		--	--	--		
EOS-1	OS	AU37	9E-03	2E+03	2E+03	PAH	Benzo(a)pyrene	C	0.084 - 0.52	4.66E-01	4/6	3.57E-06	28.0	71.9	0.0		--	--	--		
						Metal	Arsenic	C	12 - 12	1.20E+01	1/1	3.23E-05	62.8	37.2	0.0		<1	--	--	--	
						PAH	Benzo(b)fluoranthene	C	0.2 - 1.4	1.40E+00	2/4	1.07E-06	28.0	71.9	0.0		--	--	--		
EOS-1	OS	AU37	9E-03	2E+03	2E+03	Pest/PCB	Aroclor-1260	C/NC	0.16 - 6600	6.60E+03	3/4	8.89E-03	26.6	73.4	0.0		1.66E+03	29.0	71.0	0.0	

TABLE 5-11: INCREMENTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) BY PLANNED REUSE (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI									
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion						
EOS-1	OS	AV37	5E-03	9E+02	9E+02	Metal	Arsenic	C	3.3 - 24	1.38E+01	9/9	3.72E-05	62.8	37.2	0.0		<1	--	--	--							
							Lead	--	23 - 487	2.82E+02	8/9	--	--	--	--	--	--	--									
						PAH	Benzo(a)pyrene	C	0.038 - 0.52	5.20E-01	5/9	3.98E-06	28.0	71.9	0.0		--	--	--								
							Pest/PCB	Aroclor-1260	C/NC	0.24 - 3700	3.70E+03	7/9	4.98E-03	26.6	73.4	0.0		9.33E+02	29.0	71.0	0.0						
EOS-1	OS	AW37	2E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.18 - 0.18	1.80E-01	1/1	1.38E-06	28.0	71.9	0.0		--	--	--								
EOS-2	OS	AX36	2E-04	2E+00	<1	Metal	Arsenic	C	3 - 95.5	8.17E+01	4/8	2.20E-04	62.8	37.2	0.0		<1	--	--	--							
							Lead	--	5.5 - 660	6.60E+02	5/8	--	--	--	--	--	--	--									
						PAH	Benzo(a)pyrene	C	0.27 - 0.27	2.70E-01	1/8	2.07E-06	28.0	71.9	0.0		--	--	--								
							Pest/PCB	Aroclor-1254	C	0.89 - 0.89	8.90E-01	1/8	1.20E-06	26.6	73.4	0.0		<1	--	--	--						
EOS-2	OS	AX37	2E-05	<1	<1	PAH	Aroclor-1260	C	0.016 - 0.81	8.10E-01	2/8	1.09E-06	26.6	73.4	0.0		<1	--	--	--							
							Benzo(a)anthracene	C	1.7 - 1.7	1.70E+00	1/1	1.30E-06	28.0	71.9	0.0		--	--	--								
							Benzo(a)pyrene	C	2.1 - 2.1	2.10E+00	1/1	1.61E-05	28.0	71.9	0.0		--	--	--								
							Benzo(b)fluoranthene	C	3 - 3	3.00E+00	1/1	2.30E-06	28.0	71.9	0.0		--	--	--								
EOS-2	OS	AY36	1E-04	<1	<1	PAH	Benzo(k)fluoranthene	C	1.4 - 1.4	1.40E+00	1/1	1.07E-06	28.0	71.9	0.0		--	--	--								
							Metal	Arsenic	C	2.2 - 50	5.00E+01	6/6	1.35E-04	62.8	37.2	0.0		<1	--	--	--						
							PAH	Benzo(a)pyrene	C	0.67 - 0.67	6.70E-01	1/4	5.13E-06	28.0	71.9	0.0		--	--	--							
							Pest/PCB	Aroclor-1260	C	0.027 - 1.7	1.70E+00	4/6	2.29E-06	26.6	73.4	0.0		<1	--	--	--						
EOS-2	OS	AY37	7E-05	4E+00	3E+00	Metal	Arsenic	C	3.1 - 19.7	1.97E+01	3/3	5.30E-05	62.8	37.2	0.0		<1	--	--	--							
							PAH	Benzo(a)pyrene	C	0.39 - 0.39	3.90E-01	1/4	2.99E-06	28.0	71.9	0.0		--	--	--							
						Pest/PCB	Aroclor-1260	C/NC	0.19 - 12	1.20E+01	2/4	1.62E-05	26.6	73.4	0.0		3.02E+00	29.0	71.0	0.0							
							Metal	Arsenic	C	0.72 - 63	6.30E+01	10/10	1.70E-04	62.8	37.2	0.0		<1	--	--	--						
EOS-2	OS	AZ36	3E-04	3E+00	<1	Metal	Lead	--	1.5 - 453	4.53E+02	10/10	--	--	--	--		--	--	--								
							PAH	Benzo(a)anthracene	C	0.087 - 14	1.40E+01	4/5	1.07E-05	28.0	71.9	0.0		--	--	--							
						Benzo(a)pyrene		C	0.053 - 11	1.10E+01	3/5	8.42E-05	28.0	71.9	0.0		--	--	--								
						Benzo(b)fluoranthene		C	0.19 - 30	3.00E+01	4/5	2.30E-05	28.0	71.9	0.0		--	--	--								
						Benzo(k)fluoranthene		C	0.11 - 6.9	6.90E+00	3/5	5.28E-06	28.0	71.9	0.0		--	--	--								
						Chrysene		C	0.26 - 19	1.90E+01	4/5	1.45E-06	28.0	71.9	0.0		--	--	--								
						Dibenz(a,h)anthracene		C	2.1 - 2.1	2.10E+00	1/5	9.78E-06	28.0	71.9	0.0		--	--	--								
						Indeno(1,2,3-cd)pyrene		C	0.04 - 9.8	9.80E+00	3/5	7.50E-06	28.0	71.9	0.0		--	--	--								
						Pest/PCB		Aroclor-1260	C	0.016 - 3.9	3.90E+00	5/10	5.25E-06	26.6	73.4	0.0		<1	--	--	--						
						EOS-2	OS	AZ37	7E-05	<1	<1	Metal	Arsenic	C	16.1 - 18.2	1.82E+01	2/2	4.90E-05	62.8	37.2	0.0		<1	--	--	--	
													Lead	--	118 - 163	1.63E+02	2/2	--	--	--	--		--	--	--		
												PAH	Benzo(a)anthracene	C	0.15 - 1.6	1.60E+00	2/3	1.22E-06	28.0	71.9	0.0		--	--	--		
													Benzo(a)pyrene	C	0.21 - 1.5	1.50E+00	2/3	1.15E-05	28.0	71.9	0.0		--	--	--		
													Benzo(b)fluoranthene	C	0.3 - 2	2.00E+00	2/3	1.53E-06	28.0	71.9	0.0		--	--	--		
Pest/PCB	Aroclor-1260	C	0.59 - 1.4	1.40E+00	2/3								1.88E-06	26.6	73.4	0.0		<1	--	--	--						
EOS-2	OS	BA36	1E-03	5E+00	3E+00	Metal	Arsenic	C/NC	2.7 - 641	4.30E+02	12/12	1.16E-03	62.8	37.2	0.0		3.20E+00	65.5	34.4	0.1							
							Lead	--	7.6 - 1080	1.08E+03	12/12	--	--	--	--		--	--	--								
						PAH	Benzo(a)anthracene	C	0.84 - 4	4.00E+00	2/7	3.06E-06	28.0	71.9	0.0		--	--	--								
							Benzo(a)pyrene	C	0.9 - 3.1	3.10E+00	2/7	2.37E-05	28.0	71.9	0.0		--	--	--								
							Benzo(b)fluoranthene	C	0.098 - 2.9	2.90E+00	4/7	2.22E-06	28.0	71.9	0.0		--	--	--								
							Benzo(k)fluoranthene	C	0.83 - 3.1	3.10E+00	2/7	2.37E-06	28.0	71.9	0.0		--	--	--								
							Pest/PCB	Aroclor-1260	C	0.014 - 1.5	1.50E+00	6/12	2.02E-06	26.6	73.4	0.0		<1	--	--	--						
							PAH	Benzo(a)pyrene	C	0.36 - 0.36	3.60E-01	1/1	2.76E-06	28.0	71.9	0.0		--	--	--							
EOS-2	OS	BA37	4E-06	<1	<1	Metal	Arsenic	C	3.8 - 11.2	1.05E+01	5/5	2.84E-05	62.8	37.2	0.0		<1	--	--	--							
EOS-2	OS	BB36	3E-05	<1	<1	PAH	Benzo(a)pyrene	C	0.061 - 0.39	3.90E-01	2/4	2.99E-06	28.0	71.9	0.0		--	--	--								
EOS-3	OS	BC36	6E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.073 - 0.46	4.60E-01	2/2	3.52E-06	28.0	71.9	0.0		--	--	--								
EOS-3	OS	BE35	2E-05	<1	<1	Metal	Lead	--	3.8 - 6130	6.13E+03	10/10	--	--	--	--		--	--	--								
							PAH	Benzo(a)anthracene	C	0.39 - 1.7	1.70E+00	2/7	1.30E-06	28.0	71.9	0.0		--	--	--							
						Benzo(a)pyrene		C	0.52 - 1.4	1.40E+00	2/7	1.07E-05	28.0	71.9	0.0		--	--	--								
						Benzo(b)fluoranthene		C	0.79 - 4.4	4.40E+00	2/7	3.37E-06	28.0	71.9	0.0		--	--	--								
						Dibenz(a,h)anthracene		C	0.4 - 0.4	4.00E-01	1/6	1.86E-06	28.0	71.9	0.0		--	--	--								
						Pest/PCB	Aroclor-1260	C	0.094 - 1.1	1.10E+00	3/10	1.48E-06	26.6	73.4	0.0		<1	--	--	--							

TABLE 5-11: INCREMENTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SURFACE SOIL (0 TO 2 FEET BGS) BY PLANNED REUSE (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI			
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion
EOS-3	OS	BE36	4E-06	<1	<1	Metal	Lead	—	49.9 - 200	2.00E+02	4/4	—	—	—	—	—	—	—	—	—
						PAH	Benzo(a)pyrene	C	0.17 - 0.31	3.10E-01	3/4	2.37E-06	28.0	71.9	0.0	—	—	—	—	—
EOS-3	OS	BF35	2E-06	<1	<1	Metal	Lead	—	4.9 - 310	3.10E+02	6/7	—	—	—	—	—	—	—	—	
						PAH	Benzo(a)pyrene	C	0.047 - 0.21	2.10E-01	2/7	1.61E-06	28.0	71.9	0.0	—	—	—	—	—
EOS-3	OS	BF36	1E-04	<1	<1	PAH	Benzo(a)anthracene	C	0.36 - 18	1.80E+01	3/4	1.38E-05	28.0	71.9	0.0	—	—	—	—	
							Benzo(a)pyrene	C	0.25 - 15	1.29E+01	4/4	9.89E-05	28.0	71.9	0.0	—	—	—	—	—
							Benzo(b)fluoranthene	C	0.33 - 12	1.10E+01	4/4	8.42E-06	28.0	71.9	0.0	—	—	—	—	—
							Benzo(k)fluoranthene	C	14 - 14	1.40E+01	1/4	1.07E-05	28.0	71.9	0.0	—	—	—	—	—
							Chrysene	C	0.66 - 19	1.90E+01	4/4	1.45E-06	28.0	71.9	0.0	—	—	—	—	—
							Dibenz(a,h)anthracene	C	0.53 - 0.78	7.80E-01	2/4	3.63E-06	28.0	71.9	0.0	—	—	—	—	—
							Indeno(1,2,3-cd)pyrene	C	0.33 - 5.8	5.80E+00	3/4	4.44E-06	28.0	71.9	0.0	—	—	—	—	—
							Benzo(a)pyrene	C	0.58 - 0.58	5.80E-01	1/1	4.44E-06	28.0	71.9	0.0	—	—	—	—	—
EOS-3	OS	BG35	6E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.58 - 0.58	5.80E-01	1/1	4.44E-06	28.0	71.9	0.0	—	—	—	—	
							EOS-3	OS	BG36	5E-05	<1	<1	Metal	Arsenic	C	6.1 - 19.3	1.28E+01	5/7	3.43E-05	62.8
Lead	—	25.9 - 460	4.60E+02	5/7	—	—	—							—	—	—	—	—		
PAH	Benzo(a)pyrene	C	0.1 - 0.2	2.00E-01	5/7	1.53E-06	28.0						71.9	0.0	—	—	—	—	—	
Pest/PCB	Dieldrin	C	0.14 - 0.14	1.40E-01	1/7	1.19E-06	33.6						66.4	0.0	<1	—	—	—	—	—
	Dioxin	1,2,3,4,6,7,8-HPCDD	C	0.00353 - 0.00353	3.53E-03	1/1	1.51E-06						62.8	37.2	0.0	—	—	—	—	—
		1,2,3,7,8-PECDD	C	0.000606 - 0.00006	6.06E-05	1/1	2.59E-06						62.8	37.2	0.0	—	—	—	—	—
2,3,4,7,8-PECDF	C	0.000235 - 0.00023	2.35E-04	1/1	5.02E-06	62.8	37.2	0.0	—	—	—	—	—	—						
EOS-3	OS	BH36	1E-05	<1	<1	PAH	Benzo(a)pyrene	C	0.074 - 0.82	8.20E-01	3/5	6.28E-06	28.0	71.9	0.0	—	—	—	—	
EOS-3	OS	BI35	4E-08	<1	<1	Metal	Lead	—	155 - 155	1.55E+02	1/2	—	—	—	—	—	—	—		
EOS-3	OS	BI36	2E-04	<1	<1	Metal	Arsenic	C	5.1 - 73	7.30E+01	5/8	1.96E-04	62.8	37.2	0.0	<1	—	—	—	
							Lead	—	36.8 - 370	2.01E+02	6/8	—	—	—	—	—	—	—		
						PAH	Benzo(a)pyrene	C	0.038 - 0.69	6.90E-01	4/7	5.28E-06	28.0	71.9	0.0	—	—	—	—	—
							Benzo(b)fluoranthene	C	0.087 - 1.4	1.40E+00	5/8	1.07E-06	28.0	71.9	0.0	—	—	—	—	—
EOS-5	OS	ZZ01	2E-05	<1	<1	Metal	Arsenic	C	2 - 12.8	7.08E+00	11/13	1.91E-05	62.8	37.2	0.0	<1	—	—	—	
							Lead	—	6.1 - 1280	1.28E+03	13/13	—	—	—	—	—	—	—		
						PAH	Benzo(a)pyrene	C	0.18 - 0.18	1.80E-01	1/13	1.38E-06	28.0	71.9	0.0	—	—	—	—	—

Notes: All concentrations shown in milligrams per kilogram (mg/kg).

<1 Less than 1

— Not applicable or chemical is not a COC for this endpoint

% Percent

bgs Below ground surface

C Cancer effect

COC Chemical of concern

EPC Exposure point concentration

HI Hazard index

HPCCDD Heptachlorodibenzo-p-dioxin

HHRA Human health risk assessment

IND Industrial (industrial exposure scenario)

MI Maritime industrial (industrial exposure scenario)

NC Noncancer effect

OS Open space (recreational exposure scenario)

PAH Polynuclear aromatic hydrocarbon

PECDD Pentachlorodibenzo-p-dioxin

PECDF Pentachlorodibenzofuran

Pest/PCB Pesticide/polychlorinated biphenyl

RD Research and development (residential exposure scenario)

RME Reasonable maximum exposure

SVOC Semivolatile organic compound

VOC Volatile organic compound

TABLE 5-12: INCREMENTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS) BY PLANNED REUSE
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

													Percent Contribution by Exposure Pathway to Total RME Cancer Risk					Percent Contribution by Exposure Pathway to Total RME HI				
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Chemical-Specific HI	Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion
Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	Chemical-Specific HI	Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	
31A	MU	058073	3E-06	<1	<1	SVOC	Bis(2-ethylhexyl)phthalate	C	2.9 - 2.9	2.90E+00	1/4	2.54E-06	2.5	0.8	0.0	96.7	<1	--	--	--	--	
31A	MU	060074	--	1E+01	6E+00	Metal	Iron	NC	43200 - 60500	6.05E+04	2/2	--	--	--	--	--	2.75E+00	93.6	0.0	0.0	6.4	
							Manganese	NC	2970 - 5050	5.05E+03	2/2	--	--	--	--	--	--	5.99E+00	44.9	0.0	2.9	52.2
							Vanadium	NC	132 - 209	2.09E+02	2/2	--	--	--	--	--	--	3.22E+00	82.9	0.0	0.0	17.1
31B/36	IND	AR28	2E-05	<1	<1	Metal	Arsenic	C	0.44 - 32.3	9.89E+00	9/14	2.28E-05	71.6	28.4	0.0		<1	--	--	--		
31B/36	IND	AS28	2E-06	<1	<1			No COCs Identified	--	--	--	--	--	--	--	--	--	--	--	--	--	
31B/36	IND	AS29	3E-05	<1	<1	Metal	Arsenic	C	0.77 - 15.7	9.29E+00	14/23	2.14E-05	71.6	28.4	0.0		<1	--	--	--		
						PAH	Benzo(a)pyrene	C	1.2 - 1.2	1.20E+00	1/21	6.83E-06	36.8	63.2	0.0		--	--	--	--		
31B/36	IND	AT29	1E-04	<1	<1	Metal	Arsenic	C	0.83 - 130	4.94E+01	11/14	1.14E-04	71.6	28.4	0.0		<1	--	--	--		
						PAH	Benzo(a)pyrene	C	0.24 - 0.24	2.40E-01	1/13	1.37E-06	36.8	63.2	0.0		--	--	--	--		
31B/36	IND	AU29	2E-04	<1	<1	Metal	Arsenic	C	4.4 - 105	1.05E+02	13/14	2.42E-04	71.6	28.4	0.0		<1	--	--	--		
							Lead	--	8.2 - 980	9.80E+02	11/14	--	--	--	--	--	--	--	--	--	--	
						PAH	Benzo(a)pyrene	C	0.065 - 0.8	4.25E-01	5/14	2.42E-06	36.8	63.2	0.0		--	--	--	--		
31B/36	IND	AU31	2E-06	<1	<1	--	No COCs Identified	--	--	--	--	--	--	--	--	--	--	--	--	--		
31B/36	IND	AV29	9E-05	<1	<1	Metal	Arsenic	C	2.4 - 50.9	4.01E+01	18/23	9.24E-05	71.6	28.4	0.0		<1	--	--	--		
						VOC	Naphthalene	C	0.039 - 6.6	6.60E+00	2/28	1.42E-06	9.8	0.0	90.2		<1	--	--	--		
31B/36	IND	AV30	5E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.45 - 0.45	4.50E-01	1/7	2.56E-06	36.8	63.2	0.0		--	--	--	--		
40	IND	AW31	3E-05	<1	<1	Metal	Arsenic	C	1.9 - 12.3	1.17E+01	4/4	2.70E-05	71.6	28.4	0.0		<1	--	--	--		
40	IND	BA33	4E-05	<1	<1	Metal	Arsenic	C	0.7 - 21	1.39E+01	16/18	3.21E-05	71.6	28.4	0.0		<1	--	--	--		
							Pest/PCB	Aroclor-1254	C	3.4 - 3.4	3.40E+00	1/18	3.38E-06	35.1	64.9	0.0		<1	--	--	--	
							Aroclor-1260	C	2.8 - 2.8	2.80E+00	1/18	2.79E-06	35.1	64.9	0.0		<1	--	--	--		
41	IND	AX30	3E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.33 - 0.33	3.30E-01	1/1	1.88E-06	36.8	63.2	0.0		--	--	--	--		
41	IND	BA29	1E-05	<1	<1	Metal	Arsenic	C	0.64 - 12.9	4.38E+00	35/43	1.01E-05	71.6	28.4	0.0		<1	--	--	--		
41	IND	BA30	1E-05	<1	<1	Metal	Arsenic	C	0.77 - 11.6	3.47E+00	36/58	8.01E-06	71.6	28.4	0.0		<1	--	--	--		
						PAH	Benzo(a)pyrene	C	0.023 - 0.23	2.30E-01	3/39	1.31E-06	36.8	63.2	0.0		--	--	--	--		
41	IND	BB30	1E-05	<1	<1	PAH	Benzo(a)pyrene	C	0.014 - 4.8	6.59E-01	7/29	3.75E-06	36.8	63.2	0.0		--	--	--	--		
							Benzo(k)fluoranthene	C	0.021 - 2.3	2.30E+00	3/27	1.31E-06	36.8	63.2	0.0		--	--	--	--		
							Dibenz(a,h)anthracene	C	1 - 1	1.00E+00	1/27	3.46E-06	36.8	63.2	0.0		--	--	--	--		
43	IND	AO30	3E-06	<1	<1	Pest/PCB	Aroclor-1260	C	0.3 - 6.8	1.91E+00	7/23	1.90E-06	35.1	64.9	0.0		<1	--	--	--		
43	IND	AP29	2E-04	<1	<1	Metal	Arsenic	C	0.59 - 244	9.97E+01	12/19	2.30E-04	71.6	28.4	0.0		<1	--	--	--		
							PAH	Benzo(a)pyrene	C	0.038 - 0.31	2.08E-01	5/19	1.18E-06	36.8	63.2	0.0		--	--	--	--	
43	IND	AP31	2E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.2 - 0.2	2.00E-01	1/9	1.14E-06	36.8	63.2	0.0		--	--	--	--		
43	IND	AQ30	3E-05	<1	<1	Metal	Arsenic	C	0.31 - 12	6.87E+00	9/9	1.58E-05	71.6	28.4	0.0		<1	--	--	--		
							PAH	Benzo(a)pyrene	C	0.068 - 0.37	2.61E-01	9/26	1.49E-06	36.8	63.2	0.0		--	--	--	--	
						Pest/PCB	Aroclor-1260	C	0.04 - 16	9.56E+00	12/19	9.52E-06	35.1	64.9	0.0		<1	--	--	--		
43	IND	AR31	2E-05	<1	<1	Metal	Arsenic	C	1.8 - 13	7.07E+00	25/29	1.63E-05	71.6	28.4	0.0		<1	--	--	--		
						PAH	Benzo(a)pyrene	C	0.039 - 0.2	2.00E-01	3/32	1.14E-06	36.8	63.2	0.0		--	--	--	--		
43	IND	AR32	3E-05	<1	<1	Metal	Arsenic	C	0.39 - 12.6	1.13E+01	43/49	2.61E-05	71.6	28.4	0.0		<1	--	--	--		
						PAH	Benzo(a)pyrene	C	0.21 - 0.21	2.10E-01	1/57	1.20E-06	36.8	63.2	0.0		--	--	--	--		
43	IND	AS30	2E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.23 - 0.23	2.30E-01	1/6	1.31E-06	36.8	63.2	0.0		--	--	--	--		
43	IND	AS32	6E-05	<1	<1	Metal	Arsenic	C	0.81 - 27	2.30E+01	24/34	5.31E-05	71.6	28.4	0.0		<1	--	--	--		
							PAH	Benzo(a)pyrene	C	0.031 - 0.38	3.49E-01	5/45	1.99E-06	36.8	63.2	0.0		--	--	--	--	
43	IND	AS33	1E-05	<1	<1	Metal	Arsenic	C	1.8 - 15	4.30E+00	12/22	9.91E-06	71.6	28.4	0.0		<1	--	--	--		
43	IND	AT31	3E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.52 - 0.52	5.20E-01	1/26	2.96E-06	36.8	63.2	0.0		--	--	--	--		
43	IND	AT32	3E-04	<1	<1	Metal	Arsenic	C	4.4 - 168	1.48E+02	9/10	3.42E-04	71.6	28.4	0.0		<1	--	--	--		
							PAH	Benzo(a)pyrene	C	0.027 - 0.76	2.35E-01	4/26	1.34E-06	36.8	63.2	0.0		--	--	--	--	
43	IND	AT33	9E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.084 - 2.4	1.27E+00	5/9	7.25E-06	36.8	63.2	0.0		--	--	--	--		
43	IND	AU32	2E-05	<1	<1	Metal	Arsenic	C	0.97 - 12	7.97E+00	12/13	1.84E-05	71.6	28.4	0.0		<1	--	--	--		
						Pest/PCB	Aroclor-1260	C	0.053 - 2.3	1.87E+00	5/13	1.86E-06	35.1	64.9	0.0		<1	--	--	--		

TABLE 5-12: INCREMENTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI			
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion
43	IND	AU33	3E-05	<1	<1	PAH	C	0.086 - 6.5	6.50E+00	8/16	3.70E-06	36.8	63.2	0.0		--	--	--	--	
								0.061 - 3.5	3.50E+00	8/16	1.99E-05	36.8	63.2	0.0		--	--	--	--	
								0.0455 - 6.4	6.40E+00	9/16	3.64E-06	36.8	63.2	0.0		--	--	--	--	
								0.062 - 4.1	4.10E+00	8/16	2.33E-06	36.8	63.2	0.0		--	--	--	--	
43	IND	AU34	3E-06	<1	<1	PAH	C	0.3 - 0.3	3.00E-01	1/10	1.71E-06	36.8	63.2	0.0		--	--	--	--	
43	IND	AV32	8E-05	<1	<1	Metal	C	3.3 - 14	7.41E+00	13/16	1.71E-05	71.6	28.4	0.0		<1	--	--	--	
								0.19 - 4.7	4.70E+00	3/21	2.68E-06	36.8	63.2	0.0		--	--	--	--	
								0.19 - 2.1	2.10E+00	3/21	1.20E-05	36.8	63.2	0.0		--	--	--	--	
								2.3 - 2.3	2.30E+00	1/20	1.31E-06	36.8	63.2	0.0		--	--	--	--	
43	IND	AV33	1E-05	<1	<1	VOC	C	0.00038 - 19	1.90E+01	7/16	4.89E-05	0.7	0.0	99.3		<1	--	--	--	
								0.048 - 42	6.54E+00	5/25	1.40E-06	9.8	0.0	90.2		<1	--	--	--	
								0.044 - 6.4	6.36E-01	11/54	3.62E-06	36.8	63.2	0.0		--	--	--	--	
								1.1 - 1.1	1.10E+00	1/54	3.81E-06	36.8	63.2	0.0		--	--	--	--	
43	IND	AV34	2E-05	<1	<1	VOC	C	0.4 - 0.68	6.80E-01	2/37	1.75E-06	0.7	0.0	99.3		<1	--	--	--	
								1.1 - 11.2	6.89E+00	8/12	1.59E-05	71.6	28.4	0.0		<1	--	--	--	
								0.19 - 0.36	3.60E-01	3/12	2.05E-06	36.8	63.2	0.0		--	--	--	--	
								4.8 - 20	1.59E+01	6/6	3.67E-05	71.6	28.4	0.0		<1	--	--	--	
43	IND	AW33	4E-05	<1	<1	Metal	C	1.4 - 11.2	5.33E+00	12/22	1.23E-05	71.6	28.4	0.0		<1	--	--	--	
43	IND	AW34	2E-05	<1	<1	PAH	C	0.099 - 2.2	8.88E-01	7/30	5.06E-06	36.8	63.2	0.0		--	--	--	--	
44	IND	AL32	7E-06	<1	<1	PAH	C	0.036 - 0.43	4.30E-01	2/6	2.45E-06	36.8	63.2	0.0		--	--	--	--	
								0.36 - 3.6	3.60E+00	2/6	3.58E-06	35.1	64.9	0.0		<1	--	--	--	
44	IND	AM32	4E-05	3E+00	3E+00	Metal	C	1.7 - 6570	5.13E+03	14/14	--	--	--	--		--	--	--	--	
								0.043 - 0.53	3.26E-01	5/14	1.86E-06	36.8	63.2	0.0		--	--	--	--	
								0.57 - 33	2.69E+01	4/14	2.67E-05	35.1	64.9	0.0		1.87E+00	35.1	64.9	0.0	
								0.086 - 10	9.48E+00	6/14	9.44E-06	35.1	64.9	0.0		<1	--	--	--	
44	IND	AM33	3E-05	<1	<1	VOC	C	0.038 - 5.3	5.30E+00	3/14	1.14E-06	9.8	0.0	90.2		<1	--	--	--	
								2.2 - 14.1	8.03E+00	10/10	1.85E-05	71.6	28.4	0.0		<1	--	--	--	
								0.049 - 0.64	6.40E-01	4/10	3.64E-06	36.8	63.2	0.0		--	--	--	--	
								0.079 - 1.8	1.80E+00	6/10	1.03E-06	36.8	63.2	0.0		--	--	--	--	
44	IND	AM34	3E-05	<1	<1	Pest/PCB	C	0.1 - 3.9	3.90E+00	7/10	3.88E-06	35.1	64.9	0.0		<1	--	--	--	
								0.64 - 13	6.99E+00	13/16	1.61E-05	71.6	28.4	0.0		<1	--	--	--	
								0.092 - 0.75	7.50E-01	2/16	4.27E-06	36.8	63.2	0.0		--	--	--	--	
								1.6 - 1.6	1.60E+00	1/16	1.59E-06	35.1	64.9	0.0		<1	--	--	--	
44	IND	AM35	8E-05	7E+00	6E+00	Aroclor-1260	C	0.39 - 5.3	5.30E+00	3/16	5.28E-06	35.1	64.9	0.0		<1	--	--	--	
								3.5 - 32	1.73E+01	6/15	3.99E-05	71.6	28.4	0.0		<1	--	--	--	
								0.052 - 2.3	2.30E+00	11/17	1.31E-06	36.8	63.2	0.0		--	--	--	--	
								0.051 - 3.6	3.60E+00	11/17	2.05E-05	36.8	63.2	0.0		--	--	--	--	
44	IND	AN33	6E-06	<1	<1	PAH	C	0.1 - 6.4	6.40E+00	11/17	3.64E-06	36.8	63.2	0.0		--	--	--	--	
								0.071 - 0.81	8.10E-01	5/17	2.81E-06	36.8	63.2	0.0		--	--	--	--	
								0.1 - 2.3	2.30E+00	9/17	1.31E-06	36.8	63.2	0.0		--	--	--	--	
								7.1 - 7.1	7.10E+00	1/15	7.07E-06	35.1	64.9	0.0		<1	--	--	--	
44	IND	AP32	2E-05	<1	<1	VOC	NC	440 - 440	4.40E+02	1/1	--	--	--	--		2.58E+00	0.2	0.0	99.8	
								200 - 200	2.00E+02	1/1	--	--	--	--		2.87E+00	0.1	0.0	99.9	
								6.9 - 6.9	6.90E+00	1/18	1.48E-06	9.8	0.0	90.2		<1	--	--	--	
								0.06 - 1	5.30E-01	4/11	3.02E-06	36.8	63.2	0.0		--	--	--	--	
44	IND	AP37	6E-06	<1	<1	Pest/PCB	C	1.6 - 1.6	1.60E+00	1/11	1.59E-06	35.1	64.9	0.0		<1	--	--	--	
								3.9 - 11.2	1.06E+01	4/4	2.44E-05	71.6	28.4	0.0		<1	--	--	--	
								1.3 - 1.3	1.30E+00	1/12	1.29E-06	35.1	64.9	0.0		<1	--	--	--	
								0.019 - 4.3	3.31E+00	4/12	3.30E-06	35.1	64.9	0.0		<1	--	--	--	
44	IND	AQ35	5E-05	1E+01	1E+01	PAH	C	0.053 - 0.38	2.81E-01	4/9	1.60E-06	36.8	63.2	0.0		--	--	--	--	
								1400 - 1400	1.40E+03	1/1	--	--	--	--		8.21E+00	0.2	0.0	99.8	
								290 - 290	2.90E+02	1/1	--	--	--	--		4.16E+00	0.1	0.0	99.9	
								0.17 - 210	2.10E+02	2/10	4.51E-05	9.8	0.0	90.2		1.11E+00	0.5	0.0	99.5	

TABLE 5-12: INCREMENTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	
44	IND	AQ36	3E-05	<1	<1	Metal	Arsenic	2.6 - 17.6	9.36E+00	11/16	2.16E-05	71.6	28.4	0.0		<1	--	--	--		
							Lead	7.6 - 1150	1.15E+03	14/16	--	--	--	--	--	--	--	--			
						PAH	Benzo(a)pyrene	0.004 - 0.28	2.80E-01	7/16	1.59E-06	36.8	63.2	0.0	--	--	--	--			
						Pest/PCB	Aldrin	0.21 - 0.21	2.10E-01	1/16	1.45E-06	43.1	56.9	0.0	<1	--	--	--	--		
44	IND	AR35	1E-05	<1	<1	PAH	Benzo(a)anthracene	0.24 - 1.9	1.90E+00	2/2	1.08E-06	36.8	63.2	0.0		--	--	--			
							Benzo(a)pyrene	0.23 - 1.2	1.20E+00	2/2	6.83E-06	36.8	63.2	0.0	--	--	--	--			
							Benzo(k)fluoranthene	0.47 - 2.6	2.60E+00	2/2	1.48E-06	36.8	63.2	0.0	--	--	--	--			
						Metal	Arsenic	2 - 42.9	1.41E+01	7/11	3.25E-05	71.6	28.4	0.0	<1	--	--	--	--		
44	IND	AR36	4E-05	<1	<1	PAH	Benzo(a)pyrene	0.22 - 0.22	2.20E-01	1/8	1.25E-06	36.8	63.2	0.0	--	--	--	--			
						VOC	Naphthalene	12 - 15	1.50E+01	2/10	3.22E-06	9.8	0.0	90.2	<1	--	--	--	--		
						--	No COCs Identified	--	--	--	--	--	--	--	--	--	--	--			
44	IND	AR37	2E-06	<1	<1	--	No COCs Identified	--	--	--	--	--	--	--	--	--	--	--	--		
44	IND	AV36	3E-05	<1	<1	Metal	Arsenic	2.8 - 15	1.22E+01	13/13	2.82E-05	71.6	28.4	0.0		<1	--	--	--		
44	IND	AW36	2E-05	<1	<1	Metal	Arsenic	2.1 - 13	7.14E+00	12/12	1.65E-05	71.6	28.4	0.0		<1	--	--	--		
						PAH	Benzo(a)pyrene	0.059 - 1.3	4.38E-01	6/12	2.49E-06	36.8	63.2	0.0	--	--	--	--			
44	IND	AY35	3E-05	<1	<1	Metal	Arsenic	4.3 - 11.9	1.19E+01	3/3	2.74E-05	71.6	28.4	0.0		<1	--	--	--		
45	RD	033077	--	8E+00	7E+00	Metal	Manganese	700 - 6040	6.04E+03	2/2	--	--	--	--		7.16E+00	44.9	0.0	2.9	52.2	
45	RD	034074	--	<1	<1	Metal	Thallium	6.8 - 6.8	6.80E+00	1/2	--	--	--	--		1.35E+00	97.3	0.0	0.0	2.7	
45	RD	035079	4E-04	<1	<1	Metal	Arsenic	0.72 - 16.5	1.65E+01	2/3	4.31E-04	56.6	5.4	0.0	38.0	1.05E+00	66.8	5.6	0.1	27.5	
45	RD	036074	--	9E+00	3E+00	Metal	Iron	56500 - 64100	6.41E+04	2/2	--	--	--	--		2.92E+00	93.6	0.0	0.0	6.4	
							Manganese	1560 - 1580	1.58E+03	2/2	--	--	--	--		1.87E+00	44.9	0.0	2.9	52.2	
							Vanadium	42.9 - 191	1.91E+02	2/2	--	--	--	--		2.95E+00	82.9	0.0	0.0	17.1	
						Metal	Manganese	878 - 2840	2.84E+03	2/2	--	--	--	--		3.37E+00	44.9	0.0	2.9	52.2	
45	RD	037076	8E-10	4E+00	3E+00	Metal	Manganese	878 - 2840	2.84E+03	2/2	--	--	--	--		3.37E+00	44.9	0.0	2.9	52.2	
45	RD	038074	7E-08	4E+00	2E+00	Metal	Iron	32200 - 59200	5.47E+04	5/5	--	--	--	--		2.49E+00	93.6	0.0	0.0	6.4	
							Thallium	5.7 - 5.7	5.70E+00	1/5	--	--	--	--		1.13E+00	97.3	0.0	0.0	2.7	
45	RD	038077	--	<1	<1	Metal	Lead	2.8 - 161	1.61E+02	3/3	--	--	--	--		--	--	--	--		
45	RD	038079	6E-04	2E+01	2E+01	Metal	Antimony	38.4 - 38.4	3.84E+01	1/3	--	--	--	--		3.76E+00	32.7	0.0	0.0	67.3	
							Arsenic	10.7 - 21.8	2.18E+01	2/3	5.69E-04	56.6	5.4	0.0	38.0	1.39E+00	66.8	5.6	0.1	27.5	
							Cadmium	8.2 - 8.2	8.20E+00	1/3	1.39E-08	--	--	--	--	2.37E+00	8.8	0.0	0.0	91.1	
							Copper	15.4 - 165	1.65E+02	3/3	--	--	--	--		1.04E+00	5.5	0.0	0.0	94.5	
							Lead	1.9 - 504	5.04E+02	3/3	--	--	--	--		--	--	--	--		
							Zinc	40.4 - 5400	5.40E+03	3/3	--	--	--	--		1.45E+01	1.6	0.0	0.0	98.4	
						PAH	Benzo(a)anthracene	0.55 - 0.55	5.50E-01	1/3	1.49E-06	69.5	28.5	0.0	2.0	--	--	--	--		
							Benzo(a)pyrene	0.76 - 0.76	7.60E-01	1/3	2.04E-05	70.1	28.8	0.0	1.1	--	--	--	--		
							Benzo(k)fluoranthene	1.2 - 1.2	1.20E+00	1/3	3.55E-06	63.6	26.1	0.0	10.3	--	--	--	--		
						Pest/PCB	Aroclor-1260	0.58 - 0.58	5.80E-01	1/3	2.75E-06	66.1	29.2	0.0	4.7	<1	--	--	--	--	
						SVOC	Bis(2-ethylhexyl)phthalate	5.4 - 5.4	5.40E+00	1/3	4.73E-06	2.5	0.8	0.0	96.7	<1	--	--	--	--	
45	RD	039075	6E-09	3E+00	3E+00	Metal	Manganese	830 - 2600	2.60E+03	2/2	--	--	--	--		3.08E+00	44.9	0.0	2.9	52.2	
45	RD	040073	--	3E+00	2E+00	Metal	Manganese	837 - 1580	1.58E+03	2/2	--	--	--	--		1.87E+00	44.9	0.0	2.9	52.2	
45	RD	040075	4E-09	5E+00	5E+00	Metal	Manganese	386 - 4390	4.39E+03	2/2	--	--	--	--		5.21E+00	44.9	0.0	2.9	52.2	
45	RD	040082	3E-05	<1	<1	PAH	Benzo(a)anthracene	1 - 1	1.00E+00	1/3	2.70E-06	69.5	28.5	0.0	2.0	--	--	--	--		
							Benzo(a)pyrene	0.67 - 0.67	6.70E-01	1/3	1.80E-05	70.1	28.8	0.0	1.1	--	--	--	--		
							Benzo(k)fluoranthene	1 - 1	1.00E+00	1/3	2.96E-06	63.6	26.1	0.0	10.3	--	--	--	--		
							Benzo(k)fluoranthene	0.4 - 0.4	4.00E-01	1/3	1.18E-06	63.6	26.1	0.0	10.3	--	--	--	--		
45	RD	041075	2E-07	4E+00	3E+00	Metal	Manganese	936 - 2550	2.55E+03	2/2	--	--	--	--		3.02E+00	44.9	0.0	2.9	52.2	
45	RD	041079	--	6E+00	4E+00	Metal	Manganese	2950 - 2950	2.95E+03	1/1	--	--	--	--		3.50E+00	44.9	0.0	2.9	52.2	
							Vanadium	134 - 134	1.34E+02	1/1	--	--	--	--		2.07E+00	82.9	0.0	0.0	17.1	
45	RD	041082	3E-04	1E+01	6E+00	Metal	Arsenic	0.81 - 11.8	9.23E+00	6/6	2.41E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	
							Cadmium	3 - 6.8	6.80E+00	2/6	1.15E-08	--	--	--	--		1.97E+00	8.8	0.0	0.0	91.1
							Iron	28900 - 75700	5.95E+04	6/6	--	--	--	--		2.71E+00	93.6	0.0	0.0	6.4	
							Manganese	642 - 2070	1.54E+03	6/6	--	--	--	--		1.82E+00	44.9	0.0	2.9	52.2	
							Mercury	0.26 - 5.6	5.60E+00	5/6	--	--	--	--		3.52E+00	6.8	0.0	0.0	93.2	
							Silver	5 - 59.9	5.99E+01	2/6	--	--	--	--		1.21E+00	12.7	0.0	0.0	87.3	
							Zinc	98.7 - 650	6.38E+02	6/6	--	--	--	--		1.71E+00	1.6	0.0	0.0	98.4	

TABLE 5-12: INCREMENTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI																		
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion															
45	RD	041082	3E-04	1E+01	6E+00	PAH	Benzo(a)anthracene	C	0.59 - 0.59	5.90E-01	1/6	1.60E-06	69.5	28.5	0.0	2.0	--	--	--	--															
							Benzo(a)pyrene	C	0.94 - 0.94	9.40E-01	1/6	2.52E-05	70.1	28.8	0.0	1.1	--	--	--	--															
							Benzo(k)fluoranthene	C	0.2 - 1.2	1.20E+00	2/6	3.55E-06	63.6	26.1	0.0	10.3	--	--	--	--															
							Benzo(k)fluoranthene	C	0.47 - 0.47	4.70E-01	1/6	1.39E-06	63.6	26.1	0.0	10.3	--	--	--	--															
							Indeno(1,2,3-cd)pyrene	C	0.6 - 0.6	6.00E-01	1/6	1.73E-06	65.3	26.8	0.0	8.0	--	--	--	--															
45	RD	042073	3E-04	1E+01	4E+00	Pest/PCB	Dieldrin	C	0.005 - 0.005	5.00E-03	1/6	7.58E-06	1.7	0.5	0.0	97.8	<1	--	--	--															
							Metal	Arsenic	C	3.2 - 11.6	1.07E+01	4/4	2.80E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--													
								Iron	NC	23400 - 61200	6.03E+04	4/4	--	--	--	--	--	2.74E+00	93.6	0.0	0.0	6.4													
								Manganese	NC	843 - 3200	3.20E+03	4/4	--	--	--	--	--	3.80E+00	44.9	0.0	2.9	52.2													
								Thallium	NC	7.1 - 7.1	7.10E+00	1/4	--	--	--	--	--	1.41E+00	97.3	0.0	0.0	2.7													
45	RD	042074	--	5E+00	3E+00	Metal		Vanadium	NC	62 - 134	1.26E+02	4/4	--	--	--	--	1.95E+00	82.9	0.0	0.0	17.1														
							Manganese	NC	1520 - 1520	1.52E+03	1/1	--	--	--	--	--	1.80E+00	44.9	0.0	2.9	52.2														
							Vanadium	NC	202 - 202	2.02E+02	1/1	--	--	--	--	--	3.12E+00	82.9	0.0	0.0	17.1														
							45	RD	042081	3E-04	3E+00	2E+00	Metal	Arsenic	C	4.8 - 16.3	1.06E+01	4/6	2.77E-04	56.6	5.4	0.0	38.0	<1	--	--	--								
														Manganese	NC	584 - 2350	1.74E+03	6/6	--	--	--	--	--	2.06E+00	44.9	0.0	2.9	52.2							
PAH	Benzo(a)pyrene	C	0.2 - 0.2	2.00E-01	1/6	5.36E-06								70.1	28.8	0.0	1.1	--	--	--	--	--													
	Benzo(k)fluoranthene	C	0.34 - 0.34	3.40E-01	1/6	1.00E-06								63.6	26.1	0.0	10.3	--	--	--	--	--													
	45	RD	042082	4E-05	9E+00	5E+00								Metal	Antimony	NC	11.9 - 11.9	1.19E+01	1/1	--	--	--	--	--	1.16E+00	32.7	0.0	0.0	67.3						
Copper							NC	771 - 771	7.71E+02	1/1	--	--	--		--	--	4.84E+00	5.5	0.0	0.0	94.5														
Lead							--	321 - 321	3.21E+02	1/1	--	--	--		--	--	--	--	--	--	--														
Zinc							NC	794 - 794	7.94E+02	1/1	--	--	--		--	--	2.13E+00	1.6	0.0	0.0	98.4														
PAH							Benzo(a)anthracene	C	1.3 - 1.3	1.30E+00	1/1	3.51E-06	69.5		28.5	0.0	2.0	--	--	--	--	--													
	Benzo(a)pyrene	C	0.79 - 0.79	7.90E-01	1/1	2.12E-05	70.1	28.8	0.0	1.1	--	--	--	--	--																				
	Benzo(k)fluoranthene	C	2.5 - 2.5	2.50E+00	1/1	7.39E-06	63.6	26.1	0.0	10.3	--	--	--	--	--																				
	Benzo(k)fluoranthene	C	0.75 - 0.75	7.50E-01	1/1	2.22E-06	63.6	26.1	0.0	10.3	--	--	--	--	--																				
	Dibenz(a,h)anthracene	C	0.14 - 0.14	1.40E-01	1/1	2.42E-06	66.2	27.2	0.0	6.7	--	--	--	--	--																				
	Indeno(1,2,3-cd)pyrene	C	0.45 - 0.45	4.50E-01	1/1	1.30E-06	65.3	26.8	0.0	8.0	--	--	--	--	--																				
	Pest/PCB	Aroclor-1260	C	0.82 - 0.82	8.20E-01	1/1	3.89E-06	66.1	29.2	0.0	4.7	<1	--	--	--	--																			
	45	RD	043081	5E-04	5E+00	3E+00	Metal	Arsenic	C/NC	4.6 - 17.9	1.79E+01	2/5	4.68E-04	56.6	5.4	0.0	38.0	1.14E+00	66.8	5.6	0.1	27.5													
Manganese								NC	824 - 3360	2.55E+03	5/5	--	--	--	--	--	3.02E+00	44.9	0.0	2.9	52.2														
PAH							Benzo(a)pyrene	C	0.073 - 0.073	7.30E-02	1/5	1.96E-06	70.1	28.8	0.0	1.1	--	--	--	--	--														
							45	RD	043082	2E-06	5E+00	5E+00	Metal	Antimony	NC	7.3 - 43.5	4.35E+01	2/3	--	--	--	--	--	4.26E+00	32.7	0.0	0.0	67.3							
													Pest/PCB	Aroclor-1254	C	0.18 - 0.18	1.80E-01	1/3	1.94E-06	29.1	12.9	0.0	58.0	<1	--	--	--	--							
45	RD	044073	--	<1	<1	Metal							Thallium	NC	5.6 - 5.8	5.80E+00	2/2	--	--	--	--	--	1.15E+00	97.3	0.0	0.0	2.7								
													45	RD	044079	4E-04	4E+00	3E+00	Metal	Arsenic	C	14.3 - 14.3	1.43E+01	1/3	3.74E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--	
																				Manganese	NC	600 - 2440	2.44E+03	3/3	--	--	--	--	--	2.89E+00	44.9	0.0	2.9	52.2	
							45	RD	045074	1E-05	8E+00	3E+00	Metal	Iron	NC	14600 - 64100	4.82E+04	8/8	--	--	--	--	--	2.19E+00	93.6	0.0	0.0	6.4							
														45	RD	045074	1E-05	8E+00	3E+00	Metal	Manganese	NC	546 - 3430	2.37E+03	8/8	--	--	--	--	--	2.82E+00	44.9	0.0	2.9	52.2
Vanadium	NC	15.1 - 181	1.03E+02	8/8	--	--	--	--	--	1.59E+00	82.9	0.0	0.0								17.1														
PAH	Benzo(a)pyrene	C	0.22 - 0.22	2.20E-01	1/8	5.90E-06	70.1	28.8	0.0	1.1	--	--	--								--	--													
	Benzo(k)fluoranthene	C	0.54 - 0.54	5.40E-01	1/8	1.60E-06	63.6	26.1	0.0	10.3	--	--	--							--	--														
Benzo(k)fluoranthene	C	0.56 - 0.56	5.60E-01	1/8	1.66E-06	63.6	26.1	0.0	10.3	--	--	--	--							--															
Indeno(1,2,3-cd)pyrene	C	0.41 - 0.41	4.10E-01	1/8	1.18E-06	65.3	26.8	0.0	8.0	--	--	--	--	--																					
45	RD	045075	--	1E+01	4E+00	Metal	Copper	NC	90 - 170	1.70E+02	2/3	--	--	--	--	--	1.07E+00	5.5	0.0	0.0	94.5														
							Iron	NC	26200 - 67900	6.79E+04	3/3	--	--	--	--	--	3.09E+00	93.6	0.0	0.0	6.4														
							Manganese	NC	735 - 2520	2.52E+03	3/3	--	--	--	--	--	2.99E+00	44.9	0.0	2.9	52.2														
							Vanadium	NC	27.5 - 172	1.72E+02	3/3	--	--	--	--	--	2.65E+00	82.9	0.0	0.0	17.1														
							45	RD	045078	1E-03	4E+00	3E+00	Metal	Arsenic	C/NC	49.9 - 49.9	4.99E+01	1/2	1.30E-03	56.6	5.4	0.0	38.0	3.19E+00	66.8	5.6	0.1	27.5							
45	RD	046072	4E-08	2E+00	<1	Metal								Thallium	NC	5.1 - 7.1	7.10E+00	2/2	--	--	--	--	--	1.41E+00	97.3	0.0	0.0	2.7							
														45	RD	046074	3E-06	2E+01	1E+01	Metal	Copper	NC	13.2 - 536	5.36E+02	3/3	--	--	--	--	--	3.37E+00	5.5	0.0	0.0	94.5
																					Manganese	NC	438 - 2100	2.10E+03	3/3	--	--	--	--	--	2.49E+00	44.9	0.0	2.9	52.2
																					Mercury	NC	17.5 - 17.5	1.75E+01	1/3	--	--	--	--	--	1.10E+01	6.8	0.0	0.0	93.2
							Vanadium	NC	36.6 - 180	1.80E+02	3/3	--	--								--	--	--	2.78E+00	82.9	0.0	0.0	17.1							
Zinc	NC	36.7 - 567	5.67E+02	3/3	--	--	--	--	--	1.52E+00	1.6	0.0	0.0								98.4														

TABLE 5-12: INCREMENTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI			
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion
45	RD	046074	3E-06	2E+01	1E+01	PAH	Benzo(a)pyrene	C	0.04 - 0.04	4.00E-02	1/3	1.07E-06	70.1	28.8	0.0	1.1	--	--	--	--	--
45	RD	046076	6E-08	3E+00	3E+00	Metal	Manganese	NC	745 - 2440	2.22E+03	4/4	--	--	--	--	--	2.63E+00	44.9	0.0	2.9	52.2
45	RD	046082	4E-04	6E+01	3E+01	Metal	Antimony	NC	3.4 - 22.3	2.23E+01	2/3	--	--	--	--	--	2.18E+00	32.7	0.0	0.0	67.3
							Arsenic	C	1.4 - 15.2	1.52E+01	3/3	3.97E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--
							Copper	NC	45.9 - 5230	5.23E+03	3/3	--	--	--	--	--	3.29E+01	5.5	0.0	0.0	94.5
							Lead	--	3.8 - 4850	4.85E+03	3/3	--	--	--	--	--	--	--	--	--	--
							Mercury	NC	0.13 - 17	1.70E+01	3/3	--	--	--	--	--	1.07E+01	6.8	0.0	0.0	93.2
							Zinc	NC	48.9 - 2220	2.22E+03	3/3	--	--	--	--	--	5.95E+00	1.6	0.0	0.0	98.4
						PAH	Benzo(a)pyrene	C	0.093 - 0.093	9.30E-02	1/3	2.49E-06	70.1	28.8	0.0	1.1	--	--	--	--	--
						Pest/PCB	Aroclor-1260	C/NC	1.4 - 1.4	1.40E+00	1/3	6.63E-06	66.1	29.2	0.0	4.7	1.29E+00	69.6	27.3	0.0	3.1
45	RD	047074	3E-04	9E+00	6E+00	Metal	Arsenic	C	12 - 12	1.20E+01	1/1	3.13E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--
							Copper	NC	176 - 176	1.76E+02	1/1	--	--	--	--	--	1.11E+00	5.5	0.0	0.0	94.5
							Manganese	NC	5260 - 5260	5.26E+03	1/1	--	--	--	--	--	6.24E+00	44.9	0.0	2.9	52.2
45	RD	047076	1E-06	4E+00	4E+00	Metal	Mercury	NC	0.1 - 5.4	5.40E+00	4/6	--	--	--	--	--	3.39E+00	6.8	0.0	0.0	93.2
45	RD	047089	4E-06	3E+00	<1	Metal	Copper	NC	188 - 188	1.88E+02	1/1	--	--	--	--	--	1.18E+00	5.5	0.0	0.0	94.5
							Lead	--	1080 - 1080	1.08E+03	1/1	--	--	--	--	--	--	--	--	--	--
							Zinc	NC	401 - 401	4.01E+02	1/1	--	--	--	--	--	1.07E+00	1.6	0.0	0.0	98.4
						Pest/PCB	Aroclor-1260	C	0.75 - 0.75	7.50E-01	1/1	3.55E-06	66.1	29.2	0.0	4.7	<1	--	--	--	--
45	RD	047092	4E-09	<1	<1	Metal	Lead	--	187 - 187	1.87E+02	1/1	--	--	--	--	--	--	--	--	--	--
45	RD	048072	1E-05	3E+00	3E+00	Metal	Iron	NC	12200 - 61100	6.11E+04	4/4	--	--	--	--	--	2.78E+00	93.6	0.0	0.0	6.4
						PAH	Benzo(a)pyrene	C	0.46 - 0.46	4.60E-01	1/4	1.23E-05	70.1	28.8	0.0	1.1	--	--	--	--	--
45	RD	048080	7E-06	7E+01	7E+01	Metal	Antimony	NC	29 - 29	2.90E+01	1/3	--	--	--	--	--	2.84E+00	32.7	0.0	0.0	67.3
							Copper	NC	52.3 - 10400	1.04E+04	3/3	--	--	--	--	--	6.53E+01	5.5	0.0	0.0	94.5
							Lead	--	5.9 - 1900	1.90E+03	3/3	--	--	--	--	--	--	--	--	--	--
							Zinc	NC	59.5 - 784	7.84E+02	3/3	--	--	--	--	--	2.10E+00	1.6	0.0	0.0	98.4
						Pest/PCB	Aroclor-1260	C/NC	1.4 - 1.4	1.40E+00	1/3	6.63E-06	66.1	29.2	0.0	4.7	1.29E+00	69.6	27.3	0.0	3.1
45	RD	048089	--	3E+00	3E+00	Metal	Iron	NC	45300 - 59300	5.93E+04	3/3	--	--	--	--	--	2.70E+00	93.6	0.0	0.0	6.4
45	RD	049075	7E-08	3E+00	3E+00	Metal	Manganese	NC	1060 - 2380	2.38E+03	2/2	--	--	--	--	--	2.82E+00	44.9	0.0	2.9	52.2
45	RD	049079	2E-05	9E+00	4E+00	Metal	Cadmium	NC	4 - 4	4.00E+00	1/3	6.78E-09	--	--	--	--	1.16E+00	8.8	0.0	0.0	91.1
							Copper	NC	12.1 - 619	6.19E+02	3/3	--	--	--	--	--	3.89E+00	5.5	0.0	0.0	94.5
							Lead	--	2 - 1070	1.07E+03	3/3	--	--	--	--	--	--	--	--	--	--
						Pest/PCB	Aroclor-1260	C/NC	3.3 - 3.3	3.30E+00	1/3	1.56E-05	66.1	29.2	0.0	4.7	3.03E+00	69.6	27.3	0.0	3.1
45	RD	049088	3E-04	<1	<1	Metal	Arsenic	C	3.4 - 11.3	1.13E+01	3/4	2.95E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--
45	RD	049091	5E-07	2E+00	<1	Metal	Antimony	NC	5.3 - 15.1	1.51E+01	3/4	--	--	--	--	--	1.48E+00	32.7	0.0	0.0	67.3
45	RD	050071	7E-09	2E+00	2E+00	Metal	Manganese	NC	1270 - 1510	1.51E+03	2/2	--	--	--	--	--	1.79E+00	44.9	0.0	2.9	52.2
45	RD	050077	6E-06	4E+00	2E+00	Metal	Vanadium	NC	12.1 - 121	1.21E+02	3/3	--	--	--	--	--	1.87E+00	82.9	0.0	0.0	17.1
						Pest/PCB	Aroclor-1260	C/NC	1.1 - 1.1	1.10E+00	1/3	5.21E-06	66.1	29.2	0.0	4.7	1.01E+00	69.6	27.3	0.0	3.1
45	RD	050080	4E-04	4E+00	3E+00	Metal	Arsenic	C/NC	1.4 - 16.7	1.67E+01	3/3	4.36E-04	56.6	5.4	0.0	38.0	1.07E+00	66.8	5.6	0.1	27.5
							Iron	NC	41300 - 62400	6.24E+04	3/3	--	--	--	--	--	2.84E+00	93.6	0.0	0.0	6.4
						PAH	Benzo(a)pyrene	C	0.04 - 0.04	4.00E-02	1/3	1.07E-06	70.1	28.8	0.0	1.1	--	--	--	--	--
45	RD	050083	--	2E+00	2E+00	Metal	Mercury	NC	2.3 - 2.3	2.30E+00	1/1	--	--	--	--	--	1.45E+00	6.8	0.0	0.0	93.2
45	RD	050086	5E-06	<1	<1	SVOC	Pentachlorophenol	C	10 - 10	1.00E+01	1/1	3.85E-06	48.8	38.5	0.0	12.6	<1	--	--	--	--
45	RD	052075	--	6E+00	4E+00	Metal	Manganese	NC	690 - 3370	3.37E+03	3/3	--	--	--	--	--	4.00E+00	44.9	0.0	2.9	52.2
							Vanadium	NC	34.2 - 121	1.21E+02	3/3	--	--	--	--	--	1.87E+00	82.9	0.0	0.0	17.1
45	RD	052083	4E-04	3E+01	2E+01	Metal	Arsenic	C/NC	16.4 - 16.4	1.64E+01	1/1	4.28E-04	56.6	5.4	0.0	38.0	1.05E+00	66.8	5.6	0.1	27.5
							Copper	NC	3400 - 3400	3.40E+03	1/1	--	--	--	--	--	2.14E+01	5.5	0.0	0.0	94.5
							Lead	--	367 - 367	3.67E+02	1/1	--	--	--	--	--	--	--	--	--	--
							Mercury	NC	10 - 10	1.00E+01	1/1	--	--	--	--	--	6.28E+00	6.8	0.0	0.0	93.2
							Zinc	NC	582 - 582	5.82E+02	1/1	--	--	--	--	--	1.56E+00	1.6	0.0	0.0	98.4
45	RD	052085	3E-07	3E+00	2E+00	Metal	Manganese	NC	373 - 1590	1.59E+03	4/4	--	--	--	--	--	1.89E+00	44.9	0.0	2.9	52.2
45	RD	053081	3E-04	4E+00	3E+00	Metal	Arsenic	C	12.6 - 12.6	1.26E+01	1/1	3.29E-04	56.6	5.4	0.0	38.0	<1	--	--	--	--
							Cadmium	NC	11.3 - 11.3	1.13E+01	1/4	1.92E-08	--	--	--	--	3.27E+00	8.8	0.0	0.0	91.1
45	RD	053083	2E-08	2E+00	2E+00	Metal	Thallium	NC	5.5 - 5.5	5.50E+00	1/2	--	--	--	--	--	1.09E+00	97.3	0.0	0.0	2.7

TABLE 5-12: INCREMENTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS) BY PLANNED REUSE (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI			
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion
45	RD	053085	4E-06	3E+00	2E+00	Metal	Manganese	NC	374 - 1670	1.52E+03	4/4	--	--	--	--	1.80E+00	44.9	0.0	2.9	52.2
45	RD	054074	2E-06	7E+00	3E+00	SVOC	Bis(2-ethylhexyl)phthalate	C	3.6 - 3.6	3.60E+00	1/4	3.15E-06	2.5	0.8	0.0	96.7	<1	--	--	--
						Metal	Lead	--	3.5 - 597	5.97E+02	3/3	--	--	--	--	--	--	--	--	--
							Manganese	NC	368 - 1540	1.54E+03	3/3	--	--	--	--	1.83E+00	44.9	0.0	2.9	52.2
						Pest/PCB	Aroclor-1260	C	0.32 - 0.32	3.20E-01	1/3	1.52E-06	66.1	29.2	0.0	4.7	<1	--	--	--
45	RD	054075	--	3E+00	3E+00	Metal	Manganese	NC	680 - 2410	2.41E+03	2/2	--	--	--	--	2.86E+00	44.9	0.0	2.9	52.2
45	RD	054077	--	2E+00	<1	Metal	Thallium	NC	2.8 - 6.8	6.80E+00	2/2	--	--	--	--	1.35E+00	97.3	0.0	0.0	2.7
45	RD	054079	--	<1	<1	Metal	Thallium	NC	5 - 5.9	5.90E+00	2/2	--	--	--	--	1.17E+00	97.3	0.0	0.0	2.7
45	RD	054081	1E-07	4E+00	3E+00	Metal	Manganese	NC	741 - 1890	1.89E+03	2/2	--	--	--	--	2.24E+00	44.9	0.0	2.9	52.2
							Thallium	NC	6.6 - 6.6	6.60E+00	1/2	--	--	--	--	1.31E+00	97.3	0.0	0.0	2.7
45	RD	055073	--	2E+00	2E+00	Metal	Manganese	NC	942 - 1710	1.71E+03	2/2	--	--	--	--	2.03E+00	44.9	0.0	2.9	52.2
45	RD	059078	1E-07	8E+00	3E+00	Metal	Cadmium	NC	4.7 - 4.7	4.70E+00	1/8	7.97E-09	--	--	--	1.36E+00	8.8	0.0	0.0	91.1
							Iron	NC	10400 - 65400	5.04E+04	8/8	--	--	--	--	2.30E+00	93.6	0.0	0.0	6.4
							Manganese	NC	209 - 2660	1.63E+03	8/8	--	--	--	--	1.94E+00	44.9	0.0	2.9	52.2
							Vanadium	NC	28 - 175	1.11E+02	8/8	--	--	--	--	1.71E+00	82.9	0.0	0.0	17.1
EMI-1	MI	BA34	2E-05	<1	<1	Metal	Arsenic	C	0.79 - 12	7.10E+00	7/9	1.64E-05	71.6	28.4	0.0	<1	--	--	--	--
EMI-1	MI	BB32	6E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.052 - 0.46	4.60E-01	3/21	2.62E-06	36.8	63.2	0.0	--	--	--	--	--
						Pest/PCB	Aroclor-1260	C	0.019 - 1.5	1.50E+00	3/12	1.49E-06	35.1	64.9	0.0	<1	--	--	--	--
						Metal	Arsenic	C	2.7 - 13	1.30E+01	10/15	3.00E-05	71.6	28.4	0.0	<1	--	--	--	--
EMI-1	MI	BB33	4E-05	<1	<1	PAH	Benzo(a)pyrene	C	0.039 - 0.38	3.42E-01	4/25	1.95E-06	36.8	63.2	0.0	--	--	--	--	--
						Pest/PCB	Aroclor-1254	C	1.9 - 6.9	6.90E+00	2/25	6.87E-06	35.1	64.9	0.0	<1	--	--	--	--
EMI-1	MI	BB34	2E-05	<1	<1	Metal	Arsenic	C	3.2 - 14.5	7.20E+00	11/24	1.66E-05	71.6	28.4	0.0	<1	--	--	--	--
EMI-1	MI	BC33	3E-05	<1	<1	Metal	Arsenic	C	0.59 - 14.5	9.86E+00	10/12	2.27E-05	71.6	28.4	0.0	<1	--	--	--	--
EMI-1	MI	BD32	1E-04	<1	<1	Metal	Arsenic	C	3.5 - 48.6	4.86E+01	6/10	1.12E-04	71.6	28.4	0.0	<1	--	--	--	--
EMI-1	MI	BD33	3E-05	<1	<1	Metal	Arsenic	C	0.85 - 62	1.15E+01	25/26	2.64E-05	71.6	28.4	0.0	<1	--	--	--	--
						PAH	Benzo(a)pyrene	C	0.081 - 0.99	5.78E-01	4/21	3.29E-06	36.8	63.2	0.0	--	--	--	--	--
EMI-1	MI	BD34	3E-05	<1	<1	Metal	Arsenic	C	0.67 - 14.5	9.23E+00	15/20	2.13E-05	71.6	28.4	0.0	<1	--	--	--	--
						Pest/PCB	Aroclor-1254	C	0.087 - 3.3	3.30E+00	3/17	3.28E-06	35.1	64.9	0.0	<1	--	--	--	--
EMI-1	MI	BE31	3E-05	<1	<1	Metal	Arsenic	C	1.2 - 12	1.20E+01	4/5	2.77E-05	71.6	28.4	0.0	<1	--	--	--	--
EMI-1	MI	BE32	3E-05	<1	<1	PAH	Benzo(a)anthracene	C	0.076 - 2.9	2.67E+00	6/12	1.52E-06	36.8	63.2	0.0	--	--	--	--	--
							Benzo(a)pyrene	C	0.096 - 5.3	4.18E+00	6/12	2.38E-05	36.8	63.2	0.0	--	--	--	--	--
							Benzo(k)fluoranthene	C	0.064 - 4.2	4.05E+00	9/12	2.30E-06	36.8	63.2	0.0	--	--	--	--	--
							Benzo(k)fluoranthene	C	0.043 - 3.2	3.20E+00	8/12	1.82E-06	36.8	63.2	0.0	--	--	--	--	--
EMI-1	MI	BE33	2E-05	<1	<1	Metal	Arsenic	C	1.6 - 12	6.25E+00	44/45	1.44E-05	71.6	28.4	0.0	<1	--	--	--	--
						PAH	Benzo(a)pyrene	C	0.039 - 3.9	4.72E-01	15/45	2.69E-06	36.8	63.2	0.0	--	--	--	--	--
EMI-1	MI	BE34	5E-05	3E+00	3E+00	Metal	Arsenic	C	2.5 - 11.8	4.91E+00	17/26	1.13E-05	71.6	28.4	0.0	<1	--	--	--	--
						Pest/PCB	Aroclor-1254	C/NC	30 - 38	3.80E+01	2/25	3.78E-05	35.1	64.9	0.0	2.65E+00	35.1	64.9	0.0	--
EMI-1	MI	BF31	1E-04	<1	<1	Metal	Arsenic	C	0.76 - 58.1	5.81E+01	6/6	1.34E-04	71.6	28.4	0.0	<1	--	--	--	--
							Lead	--	16 - 4300	4.30E+03	6/6	--	--	--	--	--	--	--	--	--
EMI-1	MI	BF34	2E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.038 - 0.36	2.10E-01	4/10	1.20E-06	36.8	63.2	0.0	--	--	--	--	--
EMI-1	MI	BG32	6E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.27 - 0.7	7.00E-01	2/9	3.99E-06	36.8	63.2	0.0	--	--	--	--	--
EMI-1	MI	BG33	5E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.076 - 0.99	4.99E-01	5/34	2.84E-06	36.8	63.2	0.0	--	--	--	--	--
EMI-1	MI	BG34	4E-05	<1	<1	Metal	Arsenic	C	1.9 - 12	6.65E+00	9/10	1.53E-05	71.6	28.4	0.0	<1	--	--	--	--
						PAH	Benzo(a)anthracene	C	0.057 - 4.7	3.97E+00	4/10	2.26E-06	36.8	63.2	0.0	--	--	--	--	--
							Benzo(a)pyrene	C	0.066 - 3.9	2.29E+00	5/10	1.31E-05	36.8	63.2	0.0	--	--	--	--	--
							Benzo(k)fluoranthene	C	0.11 - 4.2	3.34E+00	5/10	1.90E-06	36.8	63.2	0.0	--	--	--	--	--
							Dibenz(a,h)anthracene	C	0.098 - 0.42	4.20E-01	2/10	1.46E-06	36.8	63.2	0.0	--	--	--	--	--
							Indeno(1,2,3-cd)pyrene	C	0.31 - 2.3	2.30E+00	2/10	1.31E-06	36.8	63.2	0.0	--	--	--	--	--
EMI-1	MI	BI34	2E-04	<1	<1	Metal	Arsenic	C	2.1 - 99.5	8.18E+01	6/11	1.89E-04	71.6	28.4	0.0	<1	--	--	--	--
							Lead	--	3.2 - 1340	8.36E+02	7/11	--	--	--	--	--	--	--	--	--
EMI-1	MI	BJ32	2E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.21 - 0.6	6.00E-01	2/10	3.42E-06	36.8	63.2	0.0	--	--	--	--	--
						PAH	Benzo(a)pyrene	C	0.05 - 0.26	2.60E-01	2/4	1.48E-06	36.8	63.2	0.0	--	--	--	--	--

TABLE 5-12: INCREMENTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS) BY PLANNED REUSE (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	Detection Frequency	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI			
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion
EMI-1	MI	BJ33	3E-05	<1	<1	Metal	Arsenic	C	4.1 - 12.1	1.09E+01	4/4	2.51E-05	71.6	28.4	0.0		<1	--	--	--	
EMI-1	MI	BK32	6E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.012 - 0.74	7.40E-01	3/4	4.21E-06	36.8	63.2	0.0		--	--	--		

Notes: All concentrations shown in milligrams per kilogram (mg/kg).

<1 Less than 1

-- Not applicable or chemical is not a COC for this endpoint

% Percent

bgs Below ground surface

C Cancer effect

COC Chemical of concern

EPC Exposure point concentration

HHRA Human health risk assessment

HI Hazard index

IND Industrial (industrial exposure scenario)

MI Maritime industrial (industrial exposure scenario)

MU Mixed use (residential exposure scenario)

NC Noncancer effect

PAH Polynuclear aromatic hydrocarbon

Pest/PCB Pesticide/polychlorinated biphenyl

RD Research and development (residential exposure scenario)

RME Reasonable maximum exposure

SVOC Semivolatile organic compound

VOC Volatile organic compound

TABLE 5-13: INCREMENTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	DF	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI			
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion
31B/36	IND	AR27	2E-09	<1	<1	Metal Manganese	NC	542 - 8010	8.01E+03	6/6	--	--	--	--	--	1.16E+00	92.7	0.0	7.3	--
31B/36	IND	AR28	6E-06	<1	<1	Metal Arsenic	C	0.44 - 32.3	9.89E+00	9/14	6.10E-06	70.7	29.3	0.0	--	<1	--	--	--	--
31B/36	IND	AS29	8E-06	<1	<1	Metal Arsenic	C	0.77 - 15.7	9.29E+00	14/23	5.73E-06	70.7	29.3	0.0	--	<1	--	--	--	--
						PAH Benzo(a)pyrene	C	1.2 - 1.2	1.20E+00	1/21	1.86E-06	35.8	64.2	0.0	--	--	--	--	--	--
31B/36	IND	AT29	3E-05	2E+00	<1	Metal Arsenic	C	0.83 - 130	4.94E+01	11/14	3.04E-05	70.7	29.3	0.0	--	<1	--	--	--	--
31B/36	IND	AU29	7E-05	2E+00	2E+00	Metal Arsenic	C/NC	4.4 - 105	1.05E+02	13/14	6.47E-05	70.7	29.3	0.0	--	1.60E+00	70.6	29.3	0.1	--
						Lead	--	8.2 - 980	9.80E+02	11/14	--	--	--	--	--	--	--	--	--	--
31B/36	IND	AV29	2E-05	2E+00	<1	Metal Arsenic	C	2.4 - 50.9	4.01E+01	18/23	2.47E-05	70.7	29.3	0.0	--	<1	--	--	--	--
40	IND	AW31	7E-06	<1	<1	Metal Arsenic	C	1.9 - 12.3	1.17E+01	4/4	7.21E-06	70.7	29.3	0.0	--	<1	--	--	--	--
40	IND	BA33	1E-05	5E+00	3E+00	Metal Arsenic	C	0.7 - 21	1.39E+01	16/18	8.57E-06	70.7	29.3	0.0	--	<1	--	--	--	--
						Pest/PCB Aroclor-1254	NC	3.4 - 3.4	3.40E+00	1/18	9.20E-07	--	--	--	--	1.61E+00	34.1	65.9	0.0	--
						Aroclor-1260	NC	2.8 - 2.8	2.80E+00	1/18	7.58E-07	--	--	--	--	1.33E+00	34.1	65.9	0.0	--
41	IND	BA29	3E-06	<1	<1	Metal Arsenic	C	0.64 - 12.9	4.38E+00	35/43	2.70E-06	70.7	29.3	0.0	--	<1	--	--	--	--
41	IND	BA30	3E-06	<1	<1	Metal Arsenic	C	0.77 - 11.6	3.47E+00	36/58	2.14E-06	70.7	29.3	0.0	--	<1	--	--	--	--
41	IND	BB30	3E-06	<1	<1	PAH Benzo(a)pyrene	C	0.014 - 4.8	6.59E-01	7/29	1.02E-06	35.8	64.2	0.0	--	--	--	--	--	--
43	IND	AP29	6E-05	2E+00	2E+00	Metal Arsenic	C/NC	0.59 - 244	9.97E+01	12/19	6.15E-05	70.7	29.3	0.0	--	1.52E+00	70.6	29.3	0.1	--
43	IND	AQ30	8E-06	5E+00	5E+00	Metal Arsenic	C	0.31 - 12	6.87E+00	9/9	4.24E-06	70.7	29.3	0.0	--	<1	--	--	--	--
						Pest/PCB Aroclor-1260	C/NC	0.04 - 16	9.56E+00	12/19	2.59E-06	34.1	65.9	0.0	--	4.53E+00	34.1	65.9	0.0	--
43	IND	AR31	5E-06	<1	<1	Metal Arsenic	C	1.8 - 13	7.07E+00	25/29	4.36E-06	70.7	29.3	0.0	--	<1	--	--	--	--
43	IND	AR32	8E-06	<1	<1	Metal Arsenic	C	0.39 - 12.6	1.13E+01	43/49	6.98E-06	70.7	29.3	0.0	--	<1	--	--	--	--
43	IND	AS30	5E-07	2E+00	<1	Metal Iron	NC	15100 - 122000	1.15E+05	6/6	--	--	--	--	--	1.24E+00	100.0	0.0	0.0	--
43	IND	AS32	1E-05	<1	<1	Metal Arsenic	C	0.81 - 27	2.30E+01	24/34	1.42E-05	70.7	29.3	0.0	--	<1	--	--	--	--
43	IND	AS33	3E-06	<1	<1	Metal Arsenic	C	1.8 - 15	4.30E+00	12/22	2.65E-06	70.7	29.3	0.0	--	<1	--	--	--	--
43	IND	AT32	9E-05	4E+00	2E+00	Metal Arsenic	C/NC	4.4 - 168	1.48E+02	9/10	9.15E-05	70.7	29.3	0.0	--	2.26E+00	70.6	29.3	0.1	--
						Mercury	NC	0.013 - 102	1.02E+02	9/10	--	--	--	--	--	1.10E+00	99.9	0.0	0.1	--
43	IND	AT33	3E-06	<1	<1	PAH Benzo(a)pyrene	C	0.084 - 2.4	1.27E+00	5/9	1.97E-06	35.8	64.2	0.0	--	--	--	--	--	--
43	IND	AU32	6E-06	2E+00	<1	Metal Arsenic	C	0.97 - 12	7.97E+00	12/13	4.92E-06	70.7	29.3	0.0	--	<1	--	--	--	--
43	IND	AU33	9E-06	<1	<1	PAH Benzo(a)anthracene	C	0.086 - 6.5	6.50E+00	8/16	1.01E-06	35.8	64.2	0.0	--	--	--	--	--	--
						Benzo(a)pyrene	C	0.061 - 3.5	3.50E+00	8/16	5.42E-06	35.8	64.2	0.0	--	--	--	--	--	--
43	IND	AV32	1E-05	<1	<1	Metal Arsenic	C	3.3 - 14	7.41E+00	13/16	4.57E-06	70.7	29.3	0.0	--	<1	--	--	--	--
						PAH Benzo(a)pyrene	C	0.19 - 2.1	2.10E+00	3/21	3.25E-06	35.8	64.2	0.0	--	--	--	--	--	--
						VOC Benzene	C	0.00038 - 19	1.90E+01	7/16	2.03E-06	4.3	0.0	95.7	--	<1	--	--	--	--
43	IND	AV33	3E-06	2E+00	<1	PAH Dibenz(a,h)anthracene	C	1.1 - 1.1	1.10E+00	1/54	1.04E-06	35.8	64.2	0.0	--	--	--	--	--	--
43	IND	AV34	5E-06	<1	<1	Metal Arsenic	C	1.1 - 11.2	6.89E+00	8/12	4.25E-06	70.7	29.3	0.0	--	<1	--	--	--	--
43	IND	AW33	1E-05	<1	<1	Metal Arsenic	C	4.8 - 20	1.59E+01	6/6	9.83E-06	70.7	29.3	0.0	--	<1	--	--	--	--
43	IND	AW34	6E-06	<1	<1	Metal Arsenic	C	1.4 - 11.2	5.33E+00	12/22	3.29E-06	70.7	29.3	0.0	--	<1	--	--	--	--
						PAH Benzo(a)pyrene	C	0.099 - 2.2	8.88E-01	7/30	1.38E-06	35.8	64.2	0.0	--	--	--	--	--	--
44	IND	AL32	2E-06	2E+00	2E+00	Pest/PCB Aroclor-1260	NC	0.36 - 3.6	3.60E+00	2/6	9.75E-07	--	--	--	--	1.71E+00	34.1	65.9	0.0	--
44	IND	AM32	1E-05	2E+01	2E+01	Metal Lead	--	1.7 - 6570	5.13E+03	14/14	--	--	--	--	--	--	--	--	--	--
						Pest/PCB Aroclor-1254	C/NC	0.57 - 33	2.69E+01	4/14	7.27E-06	34.1	65.9	0.0	--	1.27E+01	34.1	65.9	0.0	--
						Aroclor-1260	C/NC	0.086 - 10	9.48E+00	6/14	2.57E-06	34.1	65.9	0.0	--	4.49E+00	34.1	65.9	0.0	--
44	IND	AM33	8E-06	5E+00	2E+00	Metal Arsenic	C	2.2 - 14.1	8.03E+00	10/10	4.95E-06	70.7	29.3	0.0	--	<1	--	--	--	--
						Vanadium	NC	6.2 - 645	4.36E+02	10/10	--	--	--	--	--	1.41E+00	100.0	0.0	0.0	--
						Pest/PCB Aroclor-1260	C/NC	0.1 - 3.9	3.90E+00	7/10	1.06E-06	34.1	65.9	0.0	--	1.85E+00	34.1	65.9	0.0	--
44	IND	AM34	8E-06	4E+00	3E+00	Metal Arsenic	C	0.64 - 13	6.99E+00	13/16	4.31E-06	70.7	29.3	0.0	--	<1	--	--	--	--
						PAH Benzo(a)pyrene	C	0.092 - 0.75	7.50E-01	2/16	1.16E-06	35.8	64.2	0.0	--	--	--	--	--	--
						Pest/PCB Aroclor-1260	C/NC	0.39 - 5.3	5.30E+00	3/16	1.43E-06	34.1	65.9	0.0	--	2.51E+00	34.1	65.9	0.0	--
44	IND	AM35	2E-05	1E+01	6E+00	Metal Arsenic	C	3.5 - 32	1.73E+01	6/15	1.07E-05	70.7	29.3	0.0	--	<1	--	--	--	--
						PAH Benzo(a)pyrene	C	0.051 - 3.6	3.60E+00	11/17	5.57E-06	35.8	64.2	0.0	--	--	--	--	--	--
						Pest/PCB Aroclor-1248	C/NC	7.1 - 7.1	7.10E+00	1/15	1.92E-06	34.1	65.9	0.0	--	3.36E+00	34.1	65.9	0.0	--
						VOC 1,2,4-Trimethylbenzene	NC	440 - 440	4.40E+02	1/1	--	--	--	--	--	2.60E+00	1.1	0.0	98.9	--
						1,3,5-Trimethylbenzene	NC	200 - 200	2.00E+02	1/1	--	--	--	--	--	2.88E+00	0.4	0.0	99.6	--
44	IND	AN33	2E-06	2E+00	<1	-- No COCs Identified	--	--	--	--	--	--	--	--	--	--	--	--	--	--
44	IND	AP32	7E-06	<1	<1	Metal Arsenic	C	3.9 - 11.2	1.06E+01	4/4	6.53E-06	70.7	29.3	0.0	--	<1	--	--	--	--
44	IND	AP37	2E-06	2E+00	2E+00	Pest/PCB Aroclor-1260	NC	0.019 - 4.3	3.31E+00	4/12	8.97E-07	--	--	--	--	1.57E+00	34.1	65.9	0.0	--
44	IND	AQ35	4E-06	2E+01	1E+01	VOC 1,2,4-Trimethylbenzene	NC	1400 - 1400	1.40E+03	1/1	--	--	--	--	--	8.29E+00	1.1	0.0	98.9	--
						1,3,5-Trimethylbenzene	NC	290 - 290	2.90E+02	1/1	--	--	--	--	--	4.17E+00	0.4	0.0	99.6	--
						Naphthalene	C/NC	0.17 - 210	2.10E+02	2/10	2.79E-06	41.6	0.0	58.4	--	1.14E+00	3.0	0.0	97.0	--

TABLE 5-13: INCREMENTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	DF	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI			
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion
44	IND	AQ36	7E-06	3E+00	2E+00	Metal	Arsenic	C	2.6 - 17.6	9.36E+00	11/16	5.77E-06	70.7	29.3	0.0		<1	--	--	--	
							Lead	--	7.6 - 1150	1.15E+03	14/16	--	--	--	--		--	--	--	--	
							Vanadium	NC	22.1 - 3570	6.77E+02	16/16	--	--	--	--		2.19E+00	100.0	0.0	0.0	
44	IND	AR35	3E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.23 - 1.2	1.20E+00	2/2	1.86E-06	35.8	64.2	0.0		--	--	--	--	
44	IND	AR36	1E-05	2E+00	<1	Metal	Arsenic	C	2 - 42.9	1.41E+01	7/11	8.69E-06	70.7	29.3	0.0		<1	--	--	--	
44	IND	AV36	8E-06	<1	<1	Metal	Arsenic	C	2.8 - 15	1.22E+01	13/13	7.53E-06	70.7	29.3	0.0		<1	--	--	--	
44	IND	AW36	6E-06	<1	<1	Metal	Arsenic	C	2.1 - 13	7.14E+00	12/12	4.40E-06	70.7	29.3	0.0		<1	--	--	--	
44	IND	AY35	7E-06	<1	<1	Metal	Arsenic	C	4.3 - 11.9	1.19E+01	3/3	7.34E-06	70.7	29.3	0.0		<1	--	--	--	
45	RD	AH27	1E-05	<1	<1	Metal	Arsenic	C	0.72 - 16.5	1.65E+01	2/3	1.02E-05	70.7	29.3	0.0		<1	--	--	--	
45	RD	AI27	2E-05	<1	<1	Metal	Arsenic	C	2.4 - 21.8	2.18E+01	4/8	1.34E-05	70.7	29.3	0.0		<1	--	--	--	
						PAH	Benzo(a)pyrene	C	0.76 - 0.76	7.60E-01	1/8	1.18E-06	35.8	64.2	0.0		--	--	--	--	
45	RD	AI28	1E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.67 - 0.67	6.70E-01	1/5	1.04E-06	35.8	64.2	0.0		--	--	--	--	
45	RD	AJ25	7E-06	2E+00	<1	Metal	Arsenic	C	3.2 - 11.6	1.07E+01	4/4	6.60E-06	70.7	29.3	0.0		<1	--	--	--	
45	RD	AJ28	6E-06	<1	<1	Metal	Arsenic	C	4.2 - 17.9	7.47E+00	11/19	4.60E-06	70.7	29.3	0.0		<1	--	--	--	
45	RD	AK26	3E-06	2E+00	<1	Metal	Arsenic	C	0.88 - 12	4.52E+00	14/19	2.79E-06	70.7	29.3	0.0		<1	--	--	--	
45	RD	AK27	2E-05	<1	<1	Metal	Arsenic	C	2.9 - 49.9	3.64E+01	7/15	2.24E-05	70.7	29.3	0.0		<1	--	--	--	
45	RD	AK28	1E-05	<1	<1	Metal	Arsenic	C	1.2 - 15.2	1.52E+01	8/13	9.37E-06	70.7	29.3	0.0		<1	--	--	--	
							Lead	--	3.3 - 4850	1.04E+03	13/13	--	--	--	--		--	--	--	--	
45	RD	AL27	9E-07	2E+00	2E+00	Pest/PCB	Aroclor-1260	NC	3.3 - 3.3	3.30E+00	1/11	8.93E-07	--	--	--		1.56E+00	34.1	65.9	0.0	
45	RD	AL28	4E-07	2E+00	<1	Metal	Lead	--	5.9 - 1900	1.90E+03	3/3	--	--	--	--		--	--	--	--	
45	RD	AL30	5E-06	<1	<1	Metal	Arsenic	C	3.1 - 11.3	8.46E+00	4/5	5.22E-06	70.7	29.3	0.0		<1	--	--	--	
45	RD	AM28	1E-05	<1	<1	Metal	Arsenic	C	1.4 - 16.7	1.55E+01	4/4	9.57E-06	70.7	29.3	0.0		<1	--	--	--	
45	RD	AM29	1E-05	<1	<1	Metal	Arsenic	C	5 - 16.4	1.64E+01	3/4	1.01E-05	70.7	29.3	0.0		<1	--	--	--	
45	RD	AN28	6E-06	<1	<1	Metal	Arsenic	C	1.6 - 12.6	9.66E+00	4/5	5.96E-06	70.7	29.3	0.0		<1	--	--	--	
EMI-1	MI	BA34	5E-06	<1	<1	Metal	Arsenic	C	0.79 - 12	7.10E+00	7/9	4.38E-06	70.7	29.3	0.0		<1	--	--	--	
EMI-1	MI	BA35	1E-07	2E+00	<1	Metal	Manganese	NC	570 - 7730	7.73E+03	5/5	--	--	--	--		1.12E+00	92.7	0.0	7.3	
EMI-1	MI	BB32	2E-06	<1	<1	--	No COCs Identified	--	--	--	--	--	--	--	--		--	--	--	--	
EMI-1	MI	BB33	1E-05	4E+00	3E+00	Metal	Arsenic	C	2.7 - 13	1.30E+01	10/15	8.02E-06	70.7	29.3	0.0		<1	--	--	--	
						Pest/PCB	Aroclor-1254	C/NC	1.9 - 6.9	6.90E+00	2/25	1.87E-06	34.1	65.9	0.0		3.27E+00	34.1	65.9	0.0	
EMI-1	MI	BB34	5E-06	2E+00	<1	Metal	Arsenic	C	3.2 - 14.5	7.20E+00	11/24	4.44E-06	70.7	29.3	0.0		<1	--	--	--	
EMI-1	MI	BC33	7E-06	<1	<1	Metal	Arsenic	C	0.59 - 14.5	9.86E+00	10/12	6.08E-06	70.7	29.3	0.0		<1	--	--	--	
EMI-1	MI	BD32	3E-05	<1	<1	Metal	Arsenic	C	3.5 - 48.6	4.86E+01	6/10	3.00E-05	70.7	29.3	0.0		<1	--	--	--	
EMI-1	MI	BD33	8E-06	<1	<1	Metal	Arsenic	C	0.85 - 62	1.15E+01	25/26	7.07E-06	70.7	29.3	0.0		<1	--	--	--	
EMI-1	MI	BD34	7E-06	3E+00	2E+00	Metal	Arsenic	C	0.67 - 14.5	9.23E+00	15/20	5.69E-06	70.7	29.3	0.0		<1	--	--	--	
						Pest/PCB	Aroclor-1254	NC	0.087 - 3.3	3.30E+00	3/17	8.93E-07	--	--	--		1.56E+00	34.1	65.9	0.0	
EMI-1	MI	BE31	7E-06	<1	<1	Metal	Arsenic	C	1.2 - 12	1.20E+01	4/5	7.40E-06	70.7	29.3	0.0		<1	--	--	--	
EMI-1	MI	BE32	8E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.096 - 5.3	4.18E+00	6/12	6.46E-06	35.8	64.2	0.0		--	--	--	--	
EMI-1	MI	BE33	5E-06	<1	<1	Metal	Arsenic	C	1.6 - 12	6.25E+00	44/45	3.85E-06	70.7	29.3	0.0		<1	--	--	--	
EMI-1	MI	BE34	1E-05	2E+01	2E+01	Metal	Arsenic	C	2.5 - 11.8	4.91E+00	17/26	3.03E-06	70.7	29.3	0.0		<1	--	--	--	
						Pest/PCB	Aroclor-1254	C/NC	30 - 38	3.80E+01	2/25	1.03E-05	34.1	65.9	0.0		1.80E+01	34.1	65.9	0.0	
EMI-1	MI	BF31	4E-05	3E+00	<1	Metal	Arsenic	C	0.76 - 58.1	5.81E+01	6/6	3.58E-05	70.7	29.3	0.0		<1	--	--	--	
							Copper	NC	59 - 15000	1.50E+04	6/6	--	--	--	--		1.31E+00	100.0	0.0	0.0	
							Lead	--	16 - 4300	4.30E+03	6/6	--	--	--	--		--	--	--	--	
EMI-1	MI	BG32	2E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.27 - 0.7	7.00E-01	2/9	1.08E-06	35.8	64.2	0.0		--	--	--	--	
EMI-1	MI	BG34	1E-05	<1	<1	Metal	Arsenic	C	1.9 - 12	6.65E+00	9/10	4.10E-06	70.7	29.3	0.0		<1	--	--	--	
						PAH	Benzo(a)pyrene	C	0.066 - 3.9	2.29E+00	5/10	3.55E-06	35.8	64.2	0.0		--	--	--	--	
EMI-1	MI	BI34	5E-05	2E+00	<1	Metal	Arsenic	C/NC	2.1 - 99.5	8.18E+01	6/11	5.05E-05	70.7	29.3	0.0		1.25E+00	70.6	29.3	0.1	
							Lead	--	3.2 - 1340	8.36E+02	7/11	--	--	--	--		--	--	--	--	
EMI-1	MI	BJ33	7E-06	2E+00	<1	Metal	Arsenic	C	4.1 - 12.1	1.09E+01	4/4	6.70E-06	70.7	29.3	0.0		<1	--	--	--	
EMI-1	MI	BK32	2E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.012 - 0.74	7.40E-01	3/4	1.15E-06	35.8	64.2	0.0		--	--	--	--	
EOS-1	OS	AL35	1E-05	2E+00	<1	Metal	Arsenic	C	6.9 - 12	1.20E+01	2/3	7.40E-06	70.7	29.3	0.0		<1	--	--	--	
							Vanadium	NC	73 - 390	3.90E+02	3/3	--	--	--	--		1.26E+00	100.0	0.0	0.0	
						PAH	Benzo(a)pyrene	C	0.17 - 1.1	1.10E+00	2/3	1.70E-06	35.8	64.2	0.0		--	--	--	--	
EOS-1	OS	AL36	3E-05	8E+00	3E+00	Metal	Antimony	NC	19 - 209	2.09E+02	2/7	--	--	--	--		1.69E+00	100.0	0.0	0.0	
							Arsenic	C	2.9 - 31	3.10E+01	2/7	1.91E-05	70.7	29.3	0.0		<1	--	--	--	
							Iron	NC	6300 - 140000	1.40E+05	7/7	--	--	--	--		1.51E+00	100.0	0.0	0.0	
						PAH	Benzo(a)pyrene	C	0.18 - 2.5	2.50E+00	4/7	3.87E-06	35.8	64.2	0.0		--	--	--	--	
						Pest/PCB	Aroclor-1260	C/NC	0.11 - 5.5	5.50E+00	6/7	1.49E-06	34.1	65.9	0.0		2.61E+00	34.1	65.9	0.0	

TABLE 5-13: INCREMENTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)	Basis for COC	Range of Detected Concentrations	RME EPC	DF	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI					
												Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		
EOS-1	OS	AM36	2E-05	2E+01	1E+01	Metal	Arsenic	C	3.1 - 26	1.40E+01	9/14	8.63E-06	70.7	29.3	0.0		<1	--	--	--		
							Lead	--	9.3 - 883	8.83E+02	13/14	--	--	--	--	--	--	--	--	--	--	--
							Vanadium	NC	16 - 720	3.99E+02	14/14	--	--	--	--	1.29E+00	100.0	0.0	0.0			
						PAH	C	0.045 - 1.8	1.80E+00	5/14	2.79E-06	35.8	64.2	0.0	--	--	--	--	--	--	--	
EOS-1	OS	AM37	3E-05	1E+01	8E+00	Pest/PCB	Aroclor-1260	C/NC	0.022 - 110	2.52E+01	7/14	6.83E-06	34.1	65.9	0.0		1.20E+01	34.1	65.9	0.0		
						Metal	Antimony	NC	14.7 - 343	3.43E+02	8/14	--	--	--	--	2.77E+00	100.0	0.0	0.0			
							Arsenic	C	2.8 - 20.3	1.01E+01	11/14	6.26E-06	70.7	29.3	0.0	<1	--	--	--	--	--	
							Lead	--	160 - 10600	2.91E+03	13/14	--	--	--	--	--	--	--	--	--	--	
						PAH	Benzo(a)anthracene	C	0.15 - 20	2.00E+01	7/14	3.10E-06	35.8	64.2	0.0	--	--	--	--	--	--	--
							Benzo(a)pyrene	C	0.1 - 6.6	6.60E+00	9/14	1.02E-05	35.8	64.2	0.0	--	--	--	--	--	--	--
							Benzo(b)fluoranthene	C	0.15 - 12	1.20E+01	9/14	1.86E-06	35.8	64.2	0.0	--	--	--	--	--	--	--
							Dibenz(a,h)anthracene	C	0.041 - 1.5	1.50E+00	4/14	1.41E-06	35.8	64.2	0.0	--	--	--	--	--	--	--
						Pest/PCB	Aroclor-1254	NC	0.15 - 2.2	2.20E+00	4/14	5.96E-07	--	--	--		1.04E+00	34.1	65.9	0.0		
							Aroclor-1260	C/NC	0.074 - 15	1.50E+01	12/14	4.06E-06	34.1	65.9	0.0		7.11E+00	34.1	65.9	0.0		
EOS-1	OS	AM38	1E-05	3E+00	<1	Metal	Arsenic	C	2.1 - 19.2	1.92E+01	4/6	1.18E-05	70.7	29.3	0.0		<1	--	--	--		
EOS-1	OS	AN36	2E-06	<1	<1		PAH	Benzo(a)pyrene	C	1.3 - 1.3	1.30E+00	1/3	2.01E-06	35.8	64.2	0.0		--	--	--		
EOS-1	OS	AN37	1E-04	3E+02	2E+02			Antimony	NC	11.8 - 1930	1.93E+03	5/6	--	--	--	--	1.56E+01	100.0	0.0	0.0		
EOS-1	OS	AN38	4E-05	1E+01	6E+00	Metal		Arsenic	C	2.7 - 13.7	9.53E+00	6/6	5.88E-06	70.7	29.3	0.0		<1	--	--	--	
							Copper	NC	29.9 - 198000	1.98E+05	6/6	--	--	--	--	1.73E+01	100.0	0.0	0.0			
							Iron	NC	6220 - 194000	1.94E+05	6/6	--	--	--	--	2.09E+00	100.0	0.0	0.0			
							Lead	--	139 - 8910	5.71E+03	6/6	--	--	--	--	--	--	--	--	--		
							Nickel	NC	109 - 10300	1.03E+04	6/6	1.99E-08	--	--	--	--	1.77E+00	93.8	0.0	6.2		
							Pest/PCB	Aroclor-1260	C/NC	0.3 - 490	4.90E+02	6/8	1.33E-04	34.1	65.9	0.0		2.32E+02	34.1	65.9	0.0	
						Metal	Arsenic	C	2 - 29.5	2.58E+01	13/14	1.59E-05	70.7	29.3	0.0		<1	--	--	--	--	--
							Copper	NC	224 - 85600	2.10E+04	14/14	--	--	--	--	1.83E+00	100.0	0.0	0.0			
							Iron	NC	1740 - 198000	1.76E+05	14/14	--	--	--	--	1.90E+00	100.0	0.0	0.0			
							Lead	--	211 - 4130	2.32E+03	14/14	--	--	--	--	--	--	--	--	--	--	
PAH	Benzo(a)anthracene	C	0.079 - 36	1.84E+01	8/14	2.85E-06	35.8	64.2	0.0		--	--	--	--	--	--	--					
	Benzo(a)pyrene	C	0.064 - 14	7.07E+00	9/14	1.09E-05	35.8	64.2	0.0		--	--	--	--	--	--	--					
	Benzo(b)fluoranthene	C	0.13 - 21	8.42E+00	11/14	1.30E-06	35.8	64.2	0.0		--	--	--	--	--	--	--					
	Benzo(k)fluoranthene	C	0.045 - 20	9.71E+00	9/14	1.50E-06	35.8	64.2	0.0		--	--	--	--	--	--	--					
	Dibenz(a,h)anthracene	C	0.049 - 1.7	1.70E+00	6/14	1.60E-06	35.8	64.2	0.0		--	--	--	--	--	--	--					
Pest/PCB	Aldrin	C	0.65 - 0.65	6.50E-01	1/14	1.21E-06	42.0	58.0	0.0		<1	--	--	--	--	--	--					
	Aroclor-1260	C/NC	0.44 - 4.8	4.80E+00	7/8	1.30E-06	34.1	65.9	0.0		2.27E+00	34.1	65.9	0.0								
	Lead	--	275 - 875	8.75E+02	2/2	--	--	--	--	--	--	--	--	--	--	--						
EOS-1	OS	AN39	5E-07	2E+00	<1	Metal	Arsenic	C	5.2 - 12	1.20E+01	3/3	7.40E-06	70.7	29.3	0.0		<1	--	--	--		
EOS-1	OS	AO37	7E-06	<1	<1		Lead	--	9.3 - 2300	2.30E+03	5/7	--	--	--	--	--	--	--	--			
EOS-1	OS	AO39	9E-06	7E+00	3E+00	Metal	Antimony	NC	175 - 364	3.64E+02	3/4	--	--	--	--	2.94E+00	100.0	0.0	0.0			
							Arsenic	C	9.3 - 13.3	1.33E+01	2/5	8.20E-06	70.7	29.3	0.0		<1	--	--	--	--	
							Iron	NC	40100 - 178000	1.48E+05	5/5	--	--	--	--	1.59E+00	100.0	0.0	0.0			
							Lead	--	12.6 - 17600	1.27E+04	5/5	--	--	--	--	--	--	--	--	--	--	
EOS-1	OS	AP38	1E-05	2E+01	1E+01	Metal	Antimony	NC	13.7 - 1510	1.51E+03	2/2	--	--	--	--	1.22E+01	100.0	0.0	0.0			
							Arsenic	C	6 - 15.9	1.59E+01	2/2	9.80E-06	70.7	29.3	0.0		<1	--	--	--	--	
							Iron	NC	25500 - 200000	2.00E+05	2/2	--	--	--	--	2.15E+00	100.0	0.0	0.0			
							Lead	--	92.2 - 19700	1.97E+04	2/2	--	--	--	--	--	--	--	--	--	--	
EOS-1	OS	AQ39	8E-06	<1	<1	Metal	Arsenic	C	13 - 13	1.30E+01	1/7	8.02E-06	70.7	29.3	0.0		<1	--	--	--		
							Lead	--	9.3 - 2300	2.30E+03	5/7	--	--	--	--	--	--	--	--	--	--	
EOS-1	OS	AR40	2E-05	7E+00	6E+00	Metal	Arsenic	C	2 - 85.3	1.80E+01	15/17	1.11E-05	70.7	29.3	0.0		<1	--	--	--		
							Lead	--	7 - 2300	2.30E+03	15/17	--	--	--	--	--	--	--	--	--	--	
						PAH	C	0.082 - 3.1	6.89E-01	5/15	1.07E-06	35.8	64.2	0.0		--	--	--	--	--	--	
EOS-1	OS	AS38	2E-05	2E+00	<1	Pest/PCB	Aroclor-1260	C/NC	0.037 - 45	1.22E+01	13/17	3.31E-06	34.1	65.9	0.0		5.79E+00	34.1	65.9	0.0		
						Metal	Arsenic	C	5.4 - 56.1	3.45E+01	9/9	2.13E-05	70.7	29.3	0.0		<1	--	--	--	--	
							Lead	--	18 - 1440	1.44E+03	2/9	--	--	--	--	--	--	--	--	--	--	
EOS-1	OS	AT38	1E-05	2E+00	<1	PAH	Benzo(a)pyrene	C	0.11 - 2	9.87E-01	5/9	1.53E-06	35.8	64.2	0.0		--	--	--	--		
							Antimony	NC	160 - 160	1.60E+02	1/13	--	--	--	--	1.29E+00	100.0	0.0	0.0			
						Arsenic	C	6.1 - 12	1.02E+01	13/13	6.29E-06	70.7	29.3	0.0		<1	--	--	--	--		
EOS-1	OS	AT39	8E-06	<1	<1	Metal	Benzo(a)pyrene	C	0.084 - 5.1	1.25E+00	6/13	1.94E-06	35.8	64.2	0.0		--	--	--			
EOS-1	OS	AU37	4E-04	7E+02	7E+02	Pest/PCB	Arsenic	C	11 - 12	1.20E+01	2/2	7.40E-06	70.7	29.3	0.0		<1	--	--	--		
EOS-1	OS	AV37	2E-04	3E+02	3E+02		Aroclor-1260	C/NC	0.065 - 6600	1.54E+03	6/12	4.17E-04	34.1	65.9	0.0		7.30E+02	34.1	65.9	0.0		
						VOC	1,2,4-Trichlorobenzene	NC	0.26 - 830	8.30E+02	3/12	1.38E-07	--	--	--	--	3.69E+00	7.3	0.0	92.7		
EOS-1	OS	AV37	2E-04	3E+02	3E+02	Metal	Arsenic	C	3.3 - 24	1.06E+01	19/19	6.55E-06	70.7	29.3	0.0		<1	--	--	--		
						Pest/PCB	Aroclor-1260	C/NC	0.055 - 3700	5.37E+02	13/19	1.45E-04	34.1	65.9	0.0		2.55E+02	34.1	65.9	0.0		

TABLE 5-13: INCREMENTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	DF	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI				
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion	
EOS-2	OS	AX36	1E-05	3E+00	<1	Metal	Arsenic	C	0.66 - 95.5	1.59E+01	14/21	9.79E-06	70.7	29.3	0.0		<1	--	--	--		
EOS-2	OS	AX37	5E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.24 - 2.1	2.10E+00	2/2	3.25E-06	35.8	64.2	0.0		--	--	--	--		
EOS-2	OS	AY36	6E-05	3E+01	2E+01	Metal	Arsenic	C/NC	2 - 200	7.28E+01	16/16	4.49E-05	70.7	29.3	0.0		1.11E+00	70.6	29.3	0.1		
EOS-2	OS	AY37	1E-05	5E+00	2E+00	Pest/PCB	Aroclor-1260	C/NC	0.013 - 47	4.70E+01	12/16	1.27E-05	34.1	65.9	0.0		2.23E+01	34.1	65.9	0.0		
						Metal	Arsenic	C	3.1 - 19.7	1.42E+01	10/10	8.77E-06	70.7	29.3	0.0		<1	--	--	--	--	
							Lead	--	14.4 - 1480	1.48E+03	10/10	--	--	--	--		--	--	--	--		
						Pest/PCB	Aroclor-1260	C/NC	0.19 - 12	5.00E+00	6/11	1.35E-06	34.1	65.9	0.0		2.37E+00	34.1	65.9	0.0		
EOS-2	OS	AZ36	5E-05	4E+00	2E+00	SVOC	n-Nitroso-di-n-propylamine	C	2.8 - 2.8	2.80E+00	1/11	2.15E-06	42.0	58.0	0.0		--	--	--	--		
						Metal	Arsenic	C	0.72 - 63	3.12E+01	24/25	1.93E-05	70.7	29.3	0.0		<1	--	--	--	--	
							Lead	--	1.5 - 1700	1.18E+03	24/25	--	--	--	--		--	--	--	--		
						PAH	Benzo(a)anthracene	C	0.087 - 14	1.40E+01	5/10	2.17E-06	35.8	64.2	0.0		--	--	--	--		
							Benzo(a)pyrene	C	0.053 - 11	1.10E+01	4/10	1.70E-05	35.8	64.2	0.0		--	--	--	--		
							Benzo(b)fluoranthene	C	0.19 - 30	3.00E+01	5/10	4.64E-06	35.8	64.2	0.0		--	--	--	--		
							Benzo(k)fluoranthene	C	0.11 - 6.9	6.90E+00	4/10	1.07E-06	35.8	64.2	0.0		--	--	--	--		
							Dibenz(a,h)anthracene	C	0.16 - 2.1	2.10E+00	2/10	1.98E-06	35.8	64.2	0.0		--	--	--	--		
							Indeno(1,2,3-cd)pyrene	C	0.04 - 9.8	9.80E+00	4/10	1.52E-06	35.8	64.2	0.0		--	--	--	--		
						Pest/PCB	Aroclor-1260	C/NC	0.016 - 4.1	4.10E+00	14/25	1.11E-06	34.1	65.9	0.0		1.94E+00	34.1	65.9	0.0		
EOS-2	OS	AZ37	1E-05	3E+00	<1	Metal	Arsenic	C	2 - 35.1	1.67E+01	11/11	1.03E-05	70.7	29.3	0.0		<1	--	--	--		
							Lead	--	18.7 - 1140	1.14E+03	11/11	--	--	--	--		--	--	--	--		
EOS-2	OS	BA36	4E-05	3E+00	<1	PAH	Benzo(a)pyrene	C	0.21 - 1.5	1.50E+00	5/12	2.32E-06	35.8	64.2	0.0		--	--	--	--		
						Metal	Arsenic	C	0.59 - 641	5.93E+01	35/35	3.66E-05	70.7	29.3	0.0		<1	--	--	--	--	
EOS-2	OS	BB36	6E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.058 - 3.1	2.52E+00	7/18	3.90E-06	35.8	64.2	0.0		--	--	--	--		
						Metal	Arsenic	C	3.2 - 11.2	7.24E+00	10/10	4.46E-06	70.7	29.3	0.0		<1	--	--	--	--	
EOS-3	OS	BE35	7E-06	<1	<1	Metal	Arsenic	C	1.2 - 12.6	5.23E+00	20/24	3.23E-06	70.7	29.3	0.0		<1	--	--	--		
							Lead	--	3.8 - 6130	5.02E+03	23/24	--	--	--	--		--	--	--	--		
EOS-3	OS	BE36	2E-05	2E+00	<1	PAH	Benzo(a)pyrene	C	0.52 - 1.4	1.40E+00	2/18	2.17E-06	35.8	64.2	0.0		--	--	--	--		
						Metal	Arsenic	C	2.2 - 34	2.97E+01	5/10	1.83E-05	70.7	29.3	0.0		<1	--	--	--	--	
EOS-3	OS	BF35	5E-06	<1	<1	PAH	Benzo(a)pyrene	C	0.051 - 3.3	2.53E+00	7/10	3.92E-06	35.8	64.2	0.0		--	--	--	--		
EOS-3	OS	BF36	3E-05	<1	<1	Metal	Arsenic	C	0.87 - 22	7.01E+00	15/20	4.32E-06	70.7	29.3	0.0		<1	--	--	--		
EOS-3	OS	BG36	1E-05	2E+00	<1	PAH	Benzo(a)anthracene	C	0.36 - 18	1.80E+01	3/11	2.79E-06	35.8	64.2	0.0		--	--	--	--		
							Benzo(a)pyrene	C	0.25 - 15	1.34E+01	5/11	2.07E-05	35.8	64.2	0.0		--	--	--	--		
							Benzo(b)fluoranthene	C	0.038 - 12	1.20E+01	6/11	1.86E-06	35.8	64.2	0.0		--	--	--	--		
							Benzo(k)fluoranthene	C	14 - 14	1.40E+01	1/11	2.17E-06	35.8	64.2	0.0		--	--	--	--		
						Metal	Arsenic	C	3.9 - 19.3	1.11E+01	9/13	6.85E-06	70.7	29.3	0.0		<1	--	--	--	--	
EOS-3	OS	BG37	4E-05	5E+00	2E+00	PAH	Benzo(a)pyrene	C	0.1 - 2	1.24E+00	10/13	1.92E-06	35.8	64.2	0.0		--	--	--	--		
						Dioxin	2,3,4,7,8-PECDF	C	0.000235 - 0.000235	2.35E-04	1/1	1.15E-06	70.7	29.3	0.0		--	--	--	--		
						Metal	Antimony	NC	4.8 - 240	2.40E+02	2/2	--	--	--	--		1.94E+00	100.0	0.0	0.0		
EOS-3	OS	BG37	4E-05	5E+00	2E+00		Arsenic	C	4.6 - 30	3.00E+01	2/2	1.85E-05	70.7	29.3	0.0		<1	--	--	--		
							Lead	--	39 - 1800	1.80E+03	2/2	--	--	--	--		--	--	--	--		
						Dioxin	1,2,3,7,8-PECDD	C	0.00025 - 0.00025	2.50E-04	1/1	2.45E-06	70.7	29.3	0.0		--	--	--	--		
							2,3,4,6,7,8-HXCDF	C	0.00125 - 0.00125	1.25E-03	1/1	1.22E-06	70.7	29.3	0.0		--	--	--	--		
EOS-3	OS	BH36	1E-05	1E+01	5E+00		2,3,4,7,8-PECDF	C	0.00132 - 0.00132	1.32E-03	1/1	6.46E-06	70.7	29.3	0.0		--	--	--	--		
						Metal	Arsenic	C	3.1 - 14	6.28E+00	10/16	3.87E-06	70.7	29.3	0.0		<1	--	--	--	--	
							Lead	--	28.1 - 1500	9.53E+02	13/16	--	--	--	--		--	--	--	--		
							Vanadium	NC	27 - 1660	1.49E+03	15/16	--	--	--	--		4.81E+00	100.0	0.0	0.0		
						PAH	Benzo(a)pyrene	C	0.06 - 0.96	9.60E-01	9/15	1.49E-06	35.8	64.2	0.0		--	--	--	--		
EOS-3	OS	BH37	2E-05	<1	<1	Pest/PCB	Aroclor-1260	C/NC	0.02 - 5.6	5.60E+00	10/19	1.52E-06	34.1	65.9	0.0		2.65E+00	34.1	65.9	0.0		
						Dioxin	2,3,4,7,8-PECDF	C	0.000578 - 0.000578	5.78E-04	1/4	2.83E-06	70.7	29.3	0.0		--	--	--	--		
EOS-3	OS	BI36	1E-05	2E+00	<1	Metal	Arsenic	C	3.4 - 28	2.29E+01	7/7	1.41E-05	70.7	29.3	0.0		<1	--	--	--		
						Dioxin	2,3,4,7,8-PECDF	C	0.000673 - 0.000321	3.21E-04	4/4	1.57E-06	70.7	29.3	0.0		--	--	--	--		
EOS-3	OS	BI37	2E-05	7E+00	3E+00	Metal	Arsenic	C	1.2 - 73	1.53E+01	17/22	9.44E-06	70.7	29.3	0.0		<1	--	--	--		
						PAH	Benzo(a)pyrene	C	0.038 - 0.73	7.30E-01	10/21	1.13E-06	35.8	64.2	0.0		--	--	--	--		
						Metal	Arsenic	C	9.3 - 18	1.60E+01	5/5	9.85E-06	70.7	29.3	0.0		<1	--	--	--	--	
EOS-3	OS	BJ36	2E-05	5E+00	2E+00		Lead	--	330 - 4700	3.34E+03	5/5	--	--	--	--		--	--	--	--		
							Vanadium	NC	53 - 880	8.80E+02	5/5	--	--	--	--		2.84E+00	100.0	0.0	0.0		
						Pest/PCB	Aroclor-1260	C/NC	0.17 - 4	4.00E+00	5/5	1.08E-06	34.1	65.9	0.0		1.90E+00	34.1	65.9	0.0		
						Dioxin	2,3,4,7,8-PECDF	C	0.00013 - 0.000414	3.73E-04	4/5	1.82E-06	70.7	29.3	0.0		--	--	--	--		
						Metal	Antimony	NC	170 - 170	1.70E+02	1/1	--	--	--	--		1.37E+00	100.0	0.0	0.0		
							Arsenic	C	18 - 18	1.80E+01	1/1	1.11E-05	70.7	29.3	0.0		<1	--	--	--	--	
							Copper	NC	21000 - 21000	2.10E+04	1/1	--	--	--	--		1.83E+00	100.0	0.0	0.0		
							Lead	--	1900 - 1900	1.90E+03	1/1	--	--	--	--		--	--	--	--		
EOS-3	OS	BJ36	2E-05	5E+00	2E+00	Dioxin	1,2,3,7,8-PECDD	C	0.000235 - 0.000235	2.35E-04	1/1	2.30E-06	70.7	29.3	0.0		--	--	--	--		
							2,3,4,7,8-PECDF	C	0.000796 - 0.000796	7.96E-04	1/1	3.90E-06	70.7	29.3	0.0		--	--	--	--		

TABLE 5-13: INCREMENTAL RISK - RISK CHARACTERIZATION ANALYSIS FOR SUBSURFACE SOIL (0 TO 10 FEET BGS), CONSTRUCTION WORKER SCENARIO (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Grid Number	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Chemicals of Concern (COC)		Basis for COC	Range of Detected Concentrations	RME EPC	DF	Chemical-Specific Cancer Risk	Percent Contribution by Exposure Pathway to Total RME Cancer Risk				Chemical-Specific HI	Percent Contribution by Exposure Pathway to Total RME HI			
													Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion		Incidental Ingestion	Dermal Contact	Inhalation (Releases to Ambient Air)	Home-grown Produce Ingestion
EOS-5	OS	ZZ01	1E-05	<1	<1	Metal	Arsenic	C	1.8 - 12.8	4.09E+00	34/39	2.52E-06	70.7	29.3	0.0		<1	--	--	--	
						PAH	Benzo(a)anthracene	C	0.031 - 8.8	8.80E+00	3/39	1.36E-06	35.8	64.2	0.0		--	--	--	--	
							Benzo(a)pyrene	C	0.052 - 13	2.78E+00	4/39	4.30E-06	35.8	64.2	0.0		--	--	--	--	
							Benzo(b)fluoranthene	C	0.068 - 21	2.10E+01	3/39	3.25E-06	35.8	64.2	0.0		--	--	--	--	
							Dibenz(a,h)anthracene	C	0.075 - 1.7	1.70E+00	2/39	1.60E-06	35.8	64.2	0.0		--	--	--	--	

- Notes: All concentrations shown in mg/kg.
- Not applicable or chemical is not a COC for this endpoint
Not evaluated because exposure pathway is incomplete
- bgs
- C
- COC
- DF
- EPC
- HI
- HXCDF
- IND
- mg/kg
- MI
- NC
- OS
- PAH
- Pest
- PCB
- PECDD
- PECDF
- RD
- RME
- SVOC
- VOC
- Below ground surface
- Cancer effect
- Chemical of concern
- Detection frequency
- Exposure point concentration
- Hazard index
- Hexachlorodibenzofuran
- Industrial (industrial exposure scenario)
- Milligram per kilogram
- Maritime/Industrial (industrial exposure scenario)
- Noncancer effect
- Open space (recreational exposure scenario)
- Polynuclear aromatic hydrocarbon
- Pesticide
- Polychlorinated biphenyl
- Pentachlorodibenzo-p-dioxin
- Pentachlorodibenofuran
- Research and development (residential exposure scenario)
- Reasonable maximum exposure
- Semivolatile organic compound
- Volatile organic compound

TABLE 5-14: RISK CHARACTERIZATION ANALYSIS FOR A-AQUIFER GROUNDWATER BASED ON PLANNED REUSE
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Exposure Area	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Exposure Pathway	Source Aquifer for Exposure Pathway	Total RME Cancer Risk for Exposure Pathway	Total RME HI for Exposure Pathway	RME Segregated HI for Exposure Pathway	Chemical of Concern (COC)		Basis for COC	Detection Frequency	RME Concentration (µg/L)	Chemical-Specific Cancer Risk	Percent (%)		
																	Contribution to Total RME Cancer Risk for Exposure Pathway	Percent (%) Contribution to Total RME HI for Exposure Pathway	
31A	MU	IR-12 Plume	7.48E-05	2.86E+00	1.54E+00	Vapor Intrusion	A	7.48E-05	2.86E+00	1.54E+00	VOC	1,1-Dichloroethane	C	23 / 87	2.29E+01	3.53E-06	4.7	1.08E-02	0.4
												1,4-Dichlorobenzene	C	8 / 87	1.90E+01	8.89E-06	11.9	2.35E-03	0.1
												Benzene	C	22 / 89	4.52E+00	1.21E-05	16.1	3.41E-02	1.2
												Chloroform	C	2 / 87	2.00E+00	2.86E-06	3.8	6.14E-03	0.2
												Isopropylbenzene	NC	6 / 20	1.20E+01	--	--	1.53E+00	53.6
												Naphthalene	C	3 / 48	2.65E+01	7.39E-06	9.9	1.74E-01	6.1
												Tetrachloroethene	C	11 / 87	2.01E+01	3.74E-05	50.0	4.34E-01	15.2
												Trichloroethene	C	28 / 87	4.40E+00	1.53E-06	2.0	3.12E-03	0.1
31B/36, 43	IND	B406 Plume	6.77E-04	4.58E+00	3.21E+00	Vapor Intrusion	A	6.77E-04	4.58E+00	3.21E+00	VOC	1,2-Dichloroethene (total)	NC	6 / 41	5.80E+02	--	--	2.77E+00	60.6
												1,4-Dichlorobenzene	C	18 / 67	7.80E+00	2.17E-06	0.3	9.65E-04	0.0
												Carbon tetrachloride	C	1 / 49	4.80E-01	6.27E-06	0.9	2.44E-01	5.3
												Tetrachloroethene	C	7 / 66	1.70E+01	1.88E-05	2.8	3.66E-01	8.0
												Trichloroethene	C	8 / 67	6.17E+02	1.28E-04	18.8	4.38E-01	9.6
												Vinyl chloride	C	1 / 67	2.50E+01	5.22E-04	77.1	2.76E-01	6.0
31B/36, 43, 44	IND	IR-12 Plume	4.45E-05	2.86E+00	1.54E+00	Vapor Intrusion	A	4.45E-05	2.86E+00	1.54E+00	VOC	1,1-Dichloroethane	C	23 / 87	2.29E+01	2.10E-06	4.7	1.08E-02	0.4
												1,4-Dichlorobenzene	C	8 / 87	1.90E+01	5.29E-06	11.9	2.35E-03	0.1
												Benzene	C	22 / 89	4.52E+00	7.18E-06	16.1	3.41E-02	1.2
												Chloroform	C	2 / 87	2.00E+00	1.70E-06	3.8	6.14E-03	0.2
												Isopropylbenzene	NC	6 / 20	1.20E+01	--	--	1.53E+00	53.6
												Naphthalene	C	3 / 48	2.65E+01	4.40E-06	9.9	1.74E-01	6.1
												Tetrachloroethene	C	11 / 87	2.01E+01	2.23E-05	50.0	4.34E-01	15.2
31B/36, 40, 43, 44	IND	IR-39 Plume	1.13E-03	1.10E+01	5.31E+00	Vapor Intrusion	A	1.13E-03	1.10E+01	5.31E+00	VOC	Benzene	C/NC	15 / 48	6.27E+02	9.97E-04	88.3	4.74E+00	42.9
												Bromodichloromethane	C	2 / 46	4.00E+00	2.38E-06	0.2	3.75E-03	0.0
												Carbon tetrachloride	C	1 / 46	3.50E-01	4.57E-06	0.4	1.78E-01	1.6
												Chloroform	C	3 / 47	5.40E+01	4.60E-05	4.1	1.66E-01	1.5
												Naphthalene	C	6 / 39	2.20E+02	3.65E-05	3.2	1.45E+00	13.1
												Trichloroethene	C	5 / 46	2.05E+02	4.24E-05	3.7	1.45E-01	1.3
Xylene (total)	NC	8 / 39	1.30E+03	--	--	3.85E+00	34.9												
41	IND	IR-08 Plume	1.70E-06	2.42E-02	<1	Vapor Intrusion	A	1.70E-06	2.42E-02	<1	VOC	Chloroform	C	1 / 13	2.00E+00	1.70E-06	100.0	6.14E-03	25.4
43	IND	IR-05 Plume	3.19E-05	1.34E+00	1.30E+00	Vapor Intrusion	A	3.19E-05	1.34E+00	1.30E+00	VOC	Naphthalene	C/NC	2 / 12	1.90E+02	3.16E-05	98.9	1.25E+00	93.1
44	IND	IR-03 Plume	6.99E-05	6.55E-01	<1	Vapor Intrusion	A	6.99E-05	6.55E-01	<1	VOC	1,4-Dichlorobenzene	C	18 / 67	8.36E+01	2.33E-05	33.3	1.03E-02	1.6
												Benzene	C	39 / 67	4.76E+00	7.57E-06	10.8	3.60E-02	5.5
												Chloroform	C	3 / 67	1.40E+01	1.19E-05	17.1	4.30E-02	6.6
												Naphthalene	C	30 / 61	2.53E+01	4.19E-06	6.0	1.66E-01	25.4
												Trichloroethene	C	8 / 67	1.50E+01	3.10E-06	4.4	1.06E-02	1.6
												Vinyl chloride	C	1 / 67	8.70E-01	1.82E-05	26.0	9.62E-03	1.5
45	RD	IR-12 Plume	7.48E-05	2.86E+00	1.54E+00	Vapor Intrusion	A	7.48E-05	2.86E+00	1.54E+00	VOC	1,1-Dichloroethane	C	23 / 87	2.29E+01	3.53E-06	4.7	1.08E-02	0.4
												1,4-Dichlorobenzene	C	8 / 87	1.90E+01	8.89E-06	11.9	2.35E-03	0.1
												Benzene	C	22 / 89	4.52E+00	1.21E-05	16.1	3.41E-02	1.2
												Chloroform	C	2 / 87	2.00E+00	2.86E-06	3.8	6.14E-03	0.2
												Isopropylbenzene	NC	6 / 20	1.20E+01	--	--	1.53E+00	53.6
												Naphthalene	C	3 / 48	2.65E+01	7.39E-06	9.9	1.74E-01	6.1

TABLE 5-14: RISK CHARACTERIZATION ANALYSIS FOR A-AQUIFER GROUNDWATER BASED ON PLANNED REUSE (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Exposure Area	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Exposure Pathway	Source Aquifer for Exposure Pathway	Total RME Cancer Risk for Exposure Pathway	Total RME HI for Exposure Pathway	RME Segregated HI for Exposure Pathway	Chemical of Concern (COC)		Basis for COC	Detection Frequency	RME Concentration (µg/L)	Chemical-Specific Cancer Risk	Percent (%) Contribution to Total RME Cancer Risk for Exposure Pathway	Chemical-Specific HI	Percent (%) Contribution to Total RME HI for Exposure Pathway
45	RD	IR-12 Plume	7.48E-05	2.86E+00	1.54E+00	Vapor Intrusion	A	7.48E-05	2.86E+00	1.54E+00	VOC	Tetrachloroethene	C	11 / 87	2.01E+01	3.74E-05	50.0	4.34E-01	15.2
												Trichloroethene	C	28 / 87	4.40E+00	1.53E-06	2.0	3.12E-03	0.1
45	RD	042073	2.43E-06	6.07E-03	<1	Vapor Intrusion	A	2.43E-06	6.07E-03	<1	VOC	Chloroform	C	4 / 6	8.00E-01	1.14E-06	47.1	2.46E-03	40.5
												Trichloroethene	C	5 / 6	3.70E+00	1.28E-06	52.9	2.63E-03	43.2
EMI-1	MI	IR-03 Plume	6.99E-05	6.55E-01	<1	Vapor Intrusion	A	6.99E-05	6.55E-01	<1	VOC	1,4-Dichlorobenzene	C	18 / 67	8.36E+01	2.33E-05	33.3	1.03E-02	1.6
												Benzene	C	39 / 67	4.76E+00	7.57E-06	10.8	3.60E-02	5.5
												Chloroform	C	3 / 67	1.40E+01	1.19E-05	17.1	4.30E-02	6.6
												Naphthalene	C	30 / 61	2.53E+01	4.19E-06	6.0	1.66E-01	25.4
												Trichloroethene	C	8 / 67	1.50E+01	3.10E-06	4.4	1.06E-02	1.6
												Vinyl chloride	C	1 / 67	8.70E-01	1.82E-05	26.0	9.62E-03	1.5
EMI-1	MI	IR-08 Plume	1.70E-06	2.42E-02	<1	Vapor Intrusion	A	1.70E-06	2.42E-02	<1	VOC	Chloroform	C	1 / 13	2.00E+00	1.70E-06	100.0	6.14E-03	25.4
EMI-1	MI	B521 Plume	5.80E-05	1.70E+00	1.55E+00	Vapor Intrusion	A	5.80E-05	1.70E+00	1.55E+00	VOC	Benzene	C	3 / 72	1.00E+00	1.59E-06	2.7	7.56E-03	0.4
												Carbon tetrachloride	C/NC	1 / 73	2.00E+00	2.61E-05	45.0	1.02E+00	59.7
												Chloroform	C	2 / 73	2.40E+00	2.04E-06	3.5	7.37E-03	0.4
												Tetrachloroethene	C	6 / 73	2.44E+01	2.70E-05	46.5	5.25E-01	30.8

- Notes: All concentrations shown in micrograms per liter (µg/L).
- Not applicable or chemical is not a chemical of concern for this endpoint
- %

Percent
- C

Cancer effect
- HI

Hazard index
- IND

Industrial (industrial exposure scenario)
- IR

Installation Restoration
- MI

Maritime/industrial (industrial exposure scenario)
- MU

Mixed use (residential exposure scenario)
- NC

Noncancer effect
- RD

Research and development (residential exposure scenario)
- RME

Reasonable maximum exposure
- VOC

Volatile organic compound

TABLE 5-15: RISK CHARACTERIZATION ANALYSIS FOR A-AQUIFER GROUNDWATER, CONSTRUCTION WORKER EXPOSURE SCENARIO
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Exposure Area	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Exposure Pathway	Source Aquifer for Exposure Pathway	Total RME Cancer Risk for Exposure Pathway	Total RME HI for Exposure Pathway	RME Segregated HI for Exposure Pathway	Chemical of Concern (COC)		Basis for COC	Detection Frequency	RME Concentration	Chemical-Specific Cancer Risk	Percent (%) Contribution to Total RME Cancer Risk for Exposure Pathway	Chemical-Specific HI	Percent (%) Contribution to Total RME HI for Exposure Pathway
EOS-1	OS	IR-02 Plume	7.65E-05	9.55E-01	<1	Trench Vapor Inhalation	A	7.07E-07	3.35E-01	--	--	No COCs Identified	--	--	--	--	--	--	--
						Trench Dermal Contact	A	7.58E-05	6.20E-01	--	PAH	Benzo(a)anthracene	C	3 / 25	9.0E+00	1.3E-05	17.8	--	--
												Benzo(a)pyrene	C	1 / 25	2.0E+00	4.5E-05	58.8	--	--
												Benzo(b)fluoranthene	C	2 / 25	4.0E+00	8.9E-06	11.8	--	--
												Indeno(1,2,3-cd)pyrene	C	1 / 25	2.0E+00	6.4E-06	8.4	--	--
44, EMI-1, EOS-2, IND, MI, & OS EOS-3	IR-03 Plume	4.27E-05	1.77E+00	1.00E+00	Trench Vapor Inhalation	A	3.51E-06	1.21E+00	9.24E-01	VOC	1,4-Dichlorobenzene	C	18 / 67	8.4E+01	1.3E-06	35.8	--	--	
					Trench Dermal Contact	A	3.92E-05	5.61E-01	--	Metal PAH	Naphthalene	C	30 / 61	2.5E+01	1.1E-06	31.9	--	--	
											Arsenic	C	29 / 59	4.9E+02	1.2E-05	31.1	--	--	
											Benzo(a)anthracene	C	5 / 61	1.2E+01	1.7E-05	43.8	--	--	
											Benzo(b)fluoranthene	C	1 / 60	3.0E+00	6.7E-06	17.0	--	--	
											Chrysene	C	5 / 61	1.1E+01	1.6E-06	4.0	--	--	
31B/36, 43	IND	B406 Plume	7.53E-06	2.58E+00	2.32E+00	Trench Vapor Inhalation	A	5.99E-06	2.41E+00	2.19E+00	VOC	Trichloroethene	C	26 / 50	6.2E+02	1.7E-06	29.2	--	--
						Trench Dermal Contact	A	1.54E-06	1.71E-01	--	--	Vinyl chloride	C	4 / 49	2.5E+01	4.0E-06	66.3	--	--
												1,2-Dichloroethene (total)	NC	5 / 20	5.8E+02	--	1.9E+00	78.7	
												No COCs Identified	--	--	--	--	--	--	--
						43	IND	IR-05 Plume	1.95E-05	6.30E+00	6.08E+00	Trench Vapor Inhalation	A	8.43E-06	6.02E+00	5.92E+00	VOC	Naphthalene	C/NC
Trench Dermal Contact	A	1.11E-05	2.81E-01	--	Metal PAH VOC							Arsenic	C	21 / 21	1.2E+02	3.0E-06	27.4	--	--
												Benzo(a)anthracene	C	1 / 49	3.5E+00	5.2E-06	47.1	--	--
												Naphthalene	C	1 / 21	1.9E+02	2.8E-06	25.6	--	--
41, EMI-1	MI, IND	IR-08 Plume	2.62E-06	7.55E-02	<1	Trench Vapor Inhalation	A	6.81E-08	1.09E-02	--	--	No COCs Identified	--	--	--	--	--	--	
						Trench Dermal Contact	A	2.55E-06	6.46E-02	--	PAH	Benzo(a)pyrene	C	1 / 25	1.0E-01	2.2E-06	87.3	--	--
31A, 31B/36, 43, 44, 45	MU, RD, IND	IR-12 Plume	9.55E-06	2.60E+00	2.07E+00	Trench Vapor Inhalation	A	2.32E-06	2.11E+00	1.73E+00	VOC	Naphthalene	C	3 / 48	2.7E+01	1.2E-06	50.6	8.0E-01	37.8
						Trench Dermal Contact	A	7.23E-06	4.92E-01	--	PAH	Chrysene	C	1 / 48	3.5E+01	5.2E-06	72.3	--	--
40, 41, 43	IND	IR-39 Plume	5.44E-05	1.22E+01	8.18E+00	Trench Vapor Inhalation	A	4.51E-05	1.13E+01	8.02E+00	VOC	Benzene	C/NC	15 / 48	6.3E+02	3.3E-05	72.5	2.7E+00	23.5
						Trench Dermal Contact	A	9.21E-06	9.06E-01	--	VOC	Chloroform	C	3 / 47	5.4E+01	1.8E-06	4.1	1.1E-01	1.0
												Naphthalene	C/NC	15 / 28	2.2E+02	9.8E-06	21.6	6.6E+00	58.3
												Benzene	C	15 / 48	6.3E+02	2.5E-06	27.1	--	--
												Naphthalene	C	15 / 28	2.2E+02	3.3E-06	35.7	--	--
EMI-1, EOS-2	MI, OS	B521 Plume	1.60E-05	5.61E-01	<1	Trench Dermal Contact	A	1.54E-05	2.16E-01	--	PAH	Benzo(a)anthracene	C	1 / 44	7.8E+00	1.2E-05	75.2	--	--
												Chrysene	C	2 / 44	1.4E+01	2.1E-06	13.6	--	--
44	IND	AM32	1.573E-06	4.41E-02	<1	Trench Dermal Contact	A	1.57E-06	4.41E-02	--	Metal	Arsenic	C	4 / 6	6.3E+01	1.6E-06	100.0	--	--
44	IND	AN33	1.14E-06	3.11E-02	<1	Trench Dermal Contact	A	1.14E-06	3.11E-02	--	Metal	Arsenic	C	5 / 5	4.6E+01	1.1E-06	100.0	--	--
44	IND	AT36	2.034E-06	9.54E-02	<1	Trench Dermal Contact	A	2.03E-06	9.54E-02	--	Metal	Pentachlorophenol	C	1 / 8	1.4E+01	1.7E-06	85.4	--	--
EMI-1	MI	BF29	1.069E-06	3.72E-02	<1	Trench Dermal Contact	A	1.07E-06	3.72E-02	--	Metal	Arsenic	C	6 / 6	4.3E+01	1.1E-06	100.0	--	--

TABLE 5-15: RISK CHARACTERIZATION ANALYSIS FOR A-AQUIFER GROUNDWATER, CONSTRUCTION WORKER EXPOSURE SCENARIO (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Exposure Area	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Exposure Pathway	Source Aquifer for Exposure Pathway	Total RME Cancer Risk for Exposure Pathway	Total RME HI for Exposure Pathway	RME Segregated HI for Exposure Pathway	Chemical of Concern (COC)		Basis for COC	Detection Frequency	RME Concentration	Chemical-Specific Cancer Risk	Percent (%) Contribution to Total RME Cancer Risk for Exposure Pathway	Chemical-Specific HI	Percent (%) Contribution to Total RME HI for Exposure Pathway
EOS-1	OS	AV37	1.461E-06	1.37E-01	<1	Trench Dermal Contact	A	1.46E-06	1.37E-01	--	Metal	Arsenic	C	5 / 7	5.8E+01	1.5E-06	100.0	--	--

- Notes: All concentrations shown in micrograms per liter (µg/L).
- Not applicable or chemical is not a chemical of concern for this endpoint
- C

Cancer effect
- HI

Hazard index
- IND

Industrial
- IR

Installation Restoration
- MI

Maritime/Industrial
- MU

Mixed use (residential exposure scenario)
- NC

Noncancer effect
- OS

Open space (recreational exposure scenario)
- PAH

Polycyclic aromatic hydrocarbon
- RD

Research and development (residential exposure scenario)
- RME

Reasonable maximum exposure
- VOC

Volatile organic compound

TABLE 5-16: RISK CHARACTERIZATION ANALYSIS FOR B-AQUIFER GROUNDWATER BASED ON DOMESTIC USE

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	Exposure Area	Total RME Cancer Risk	Total RME HI	RME Segregated HI	Exposure Pathway	Source Aquifer for Exposure Pathway	Total RME Cancer Risk for Exposure Pathway	Total RME HI for Exposure Pathway	Chemical of Concern (COC)		Basis for COC	Detection Frequency	RME Concentration	Chemical-Specific Cancer Risk	Percent (%) Contribution to Total RME Cancer Risk for Exposure Pathway	Chemical-Specific HI	Percent (%) Contribution to Total RME HI for Exposure Pathway
EOS-1	OS	IR-02 Plume	2.99E-04	4.03E+00	2.64E+00	Domestic Use	B	2.99E-04	4.03E+00	Metal	Arsenic	C	1 / 3	2.1E+00	3.0E-04	100.0	<1	--
											Manganese	NC	3 / 3	2.3E+03	--	--	2.6E+00	65.4
44, EMI-1, EOS-2, EOS-3	IND, MI, OS	IR-03 Plume	8.85E-04	1.58E+00	<1	Domestic Use	B	8.85E-04	1.58E+00	Metal	Arsenic	C	5 / 8	6.2E+00	8.8E-04	99.8	<1	--
										VOC	Tetrachloroethene	C	1 / 10	1.6E-01	1.5E-06	0.2	<1	--
31B/36, 43	IND	B406 Plume	4.18E-04	4.41E+00	2.51E+00	Domestic Use	B	4.18E-04	4.41E+00	Metal	Arsenic	C	2 / 3	2.7E+00	3.8E-04	92.0	<1	--
											Manganese	NC	3 / 3	2.2E+03	--	--	2.5E+00	55.9
											Thallium	NC	1 / 3	3.5E+00	--	--	1.5E+00	33.0
										VOC	1,4-Dichlorobenzene	C	1 / 8	1.6E+00	5.4E-06	1.3	<1	--
											Tetrachloroethene	C	1 / 8	2.9E+00	2.8E-05	6.7	<1	--
31B/36	IND	065082	4.52E-04	2.07E+00	1.77E+00	Domestic Use	B	4.52E-04	2.07E+00	Metal	Manganese	NC	3 / 3	9.6E+02	--	--	1.1E+00	52.7
											VOC	1,4-Dichlorobenzene	C	1 / 8	1.7E+01	5.7E-05	12.7	<1
										Tetrachloroethene	C	1 / 8	4.1E+01	3.9E-04	87.1	<1	--	
										Trichloroethene	C	1 / 8	1.5E+00	1.1E-06	0.2	<1	--	
31B/36	IND	071079	3.07E-04	6.57E-01	<1	Domestic Use	B	3.07E-04	6.57E-01	Metal	Arsenic	C	1 / 3	1.4E+00	2.0E-04	65.0	<1	--
											VOC	1,4-Dichlorobenzene	C	1 / 9	2.2E+00	7.4E-06	2.4	<1
										Tetrachloroethene	C	1 / 9	6.1E+00	5.9E-05	19.1	<1	--	
										Vinyl chloride	C	1 / 9	1.3E+00	4.1E-05	13.4	<1	--	
EOS-3	OS	099102	7.40E-04	3.96E+00	2.59E+00	Domestic Use	B	7.40E-04	3.96E+00	Metal	Arsenic	C	3 / 3	5.2E+00	7.4E-04	100.0	<1	--
											Manganese	NC	3 / 3	2.2E+03	--	--	2.5E+00	63.8

Notes: All concentrations shown in micrograms per liter (µg/L).
Risk results shown are based on based on residential exposure to B-aquifer groundwater from domestic use. The risk chracterization analysis for domestic use of groundwater in the B-aquifer is based on risk results parcel-wide, regardless of planned reuse.

-
- C
- HI
- IND
- IR
- MI
- NC
- OS
- RME
- VOC
- Not applicable or chemical is not a chemical of concern for this endpoint
- Cancer effect
- Hazard index
- Industrial (industrial exposure scenario)
- Installation Restoration
- Maritime/Industrial (industrial exposure scenario)
- Noncancer effect
- Open space (recreational exposure scenario)
- Reasonable maximum exposure
- Volatile organic compound

TABLE 5-17: RISK TO BIRDS AND MAMMALS AT PARCEL E

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Analyte	EPC (mg/kg)	House Mouse				American Kestrel		Red-tailed Hawk	
		Adult		Juvenile					
		PSC (mg/kg)	HQ	PSC (mg/kg)	HQ	PSC (mg/kg)	HQ	PSC (mg/kg)	HQ
Metals									
Copper	1,061.84	470	2.26	598	1.78	1,084	0.98	133,137	0.01
Lead - original TRV	525.63	808	0.65	1,365	0.39	442	1.19	1,057	0.50
Lead - revised TRV	525.63	197	2.67	252	2.09	442	1.19	1,057	0.50
Molybdenum	30.82	46	0.67	58	0.53	1,269	0.02	170,885	0.0002
Nickel	359.32	1,941	0.19	2,751	0.13	2,563	0.14	NA	NC
Zinc	700.13	719	0.97	1,111	0.63	1,927	0.36	NA	NC
Organic Compounds									
Toluene	0.01	4,577	0.000003	5,811	0.000002	NA	NC	NA	NC
Trichloroethene	0.21	123	0.0017	157	0.001	NA	NC	NA	NC
Xylene	0.01	369	0.00002	469	0.00002	NA	NC	NA	NC
Total Aroclors	79.91	62	1.29	37	2.16	37	2.16	4,984	0.02
Total DDTs	0.29	162	0.002	206	0.001	4	0.07	476	0.001

Notes: Shaded and bold text indicates HQ exceeded 1.

DDT Dichlorodiphenyltrichloroethane

EPC Exposure point concentration; the lower of the maximum or the UCL₉₅ concentration in soil in Parcel E

HQ Hazard quotient

mg/kg Milligram per kilogram

NA Not available

NC Not calculated

PSC Protective soil concentration

UCL₉₅ 95 percent upper confidence limit on the mean

TRV Toxicity reference value

6.0 REMEDIAL INVESTIGATION SUMMARY AND CONCLUSION

The purpose of this revised Parcel E RI Report is to (1) characterize the nature and extent of CERCLA-regulated hazardous chemicals at Parcel E, (2) assess risks associated with chemicals present at Parcel E, and (3) identify areas proposed for response action. This revised report was prepared because the Parcel E boundaries had changed and several investigations and removal actions had been conducted at the parcel since the original RI report was submitted in 1997 (Tetra Tech, LFR, and U&A 1997).

6.1 REMEDIAL INVESTIGATION SUMMARY

This revised Parcel E RI report accomplished the following objectives:

- Summarized previous investigations, evaluations, and removal actions conducted in Parcel E. These activities included (1) initial investigations to identify sites where releases may have occurred; (2) investigations using biased sampling methods to characterize the nature and extent of CERCLA-regulated chemicals; (3) removal actions conducted to limit risks to human health and the environment; and (4) other investigations conducted in parallel with the CERCLA RI process, such as those related to TPH and radioactive materials.
- Summarized the physical characteristics of Parcel E, including geology and hydrogeology, relevant to understanding the current conditions at Parcel E and how they may impact future migration and exposure to chemicals present at Parcel E.
- Evaluated the nature and extent of chemicals in soil, groundwater, and sediment at Parcel E by compiling and evaluating data from previous investigations. The nature and extent evaluation was conducted separately for each redevelopment block at Parcel E.
- Developed a CSM that describes the sources of chemicals, transport routes, exposure pathways, and potential human and ecological receptors.
- Conducted risk assessments that used the CSMs and data from previous investigations to identify areas that are proposed for response action to protect human health and the environment.

Risks associated with radioactive materials are being assessed separately under the basewide radiological program, and therefore were not addressed in this RI Report. Sites where TPH and associated fuel constituents are the only COCs are being addressed under the TPH corrective action program.

The HHRA evaluated potential risks to human receptors for exposure pathways and scenarios associated with the planned reuse of each redevelopment block. The HHRA results for soil, groundwater, and sediment are summarized below:

- **Soil:** The total risk results for soil indicated that concentrations of chemicals in many grids throughout Parcel E present a potential risk based on an excess lifetime cancer risk threshold of $1E-06$ or potential noncancer hazards that exceeded the threshold HI of 1.0, based on planned reuse. Under the incremental risk evaluation for soil, fewer grids exceeded the cancer risk or noncancer hazard thresholds because metals at concentrations less than ambient concentrations (those considered by the Navy to be ubiquitous) were excluded from the risk analysis. The chemicals in soil at Parcel E that contribute to human health risk include metals at concentrations above ambient concentrations and organic chemicals such as VOCs, SVOCs, PCBs, and pesticides.
- **Groundwater:** The HHRA results for groundwater indicated that risk from exposure to VOCs in the A-aquifer from vapor intrusion exceeded the excess lifetime cancer risk threshold of $1E-06$ and noncancer HI threshold of 1.0 in several redevelopment blocks at Parcel E. The HHRA also found that risk from exposure to arsenic, manganese, and VOCs in B-aquifer groundwater from domestic use exceeded the excess lifetime cancer risk threshold of $1E-06$ and noncancer hazard index threshold of 1.0 in several redevelopment blocks at Parcel E.
- **Sediment:** The HHRA results for sediment in the intertidal zone indicated that risk from exposure to total PCBs from direct contact and risk from exposure to chromium and total PCBs from shellfish ingestion exceeded the cancer risk threshold of $1E-06$ and noncancer HI threshold of 1.0 in redevelopment blocks along the shoreline at Parcel E.

Potential risks to ecological receptors posed by exposure to onshore soil and intertidal sediments were evaluated in the BERA and SLERA, respectively:

- The BERA evaluated potential ecological risks from exposure to onshore soil in areas planned for open space reuse along the Parcel E shoreline. The BERA found potential risk to bird and mammals from exposure to copper, lead, and total PCBs in onshore soil in the open space areas. Risk to ecological receptors is not considered significant and does not warrant response action based only on ecological concerns. However, ecological benchmarks will be considered during any response action undertaken to address risk identified in the HHRA.
- The SLERA, which was presented as part of the Parcels E and E-2 Shoreline Characterization Technical Memorandum, evaluated potential ecological risk from exposure to sediments in the intertidal zone, which includes all of the Parcel E shoreline. The SLERA found potential risk to benthic invertebrates, birds, and mammals from exposure to metals and total PCBs in surface and subsurface sediments along the shoreline.

The potential for chemicals in groundwater to affect the Bay was evaluated by screening the most recent groundwater data in the RI data set against surface water criteria listed in Table 4-1. Based on this evaluation, metals, PCBs, and TPH in groundwater have the potential to affect the Bay.

Table 6-1 summarizes the major findings of this Revised Parcel E RI Report. The table identifies each redevelopment block at Parcel E and, for each redevelopment block, summarizes the proposed reuse, IR sites, and Triple A sites encompassed; past activities and potential sources; geology and hydrogeology; nature and extent of contamination; and risk to human health and the environment. Figure 6-1 shows a parcel-wide compilation of all chemicals that exceed applicable soil screening criteria based on the planned reuse of each redevelopment block at Parcel E. The relative magnitude of the elevated concentrations is illustrated using symbols graduated by size and color. Figure 6-1 illustrates that the distribution of chemicals in soil at Parcel E is widespread, particularly along the shoreline and in areas associated with industrial activities or disposal. Figure 6-2 shows plumes delineated based on 2004 data, as well as human health risk plumes developed in accordance with the HHRA methodology.

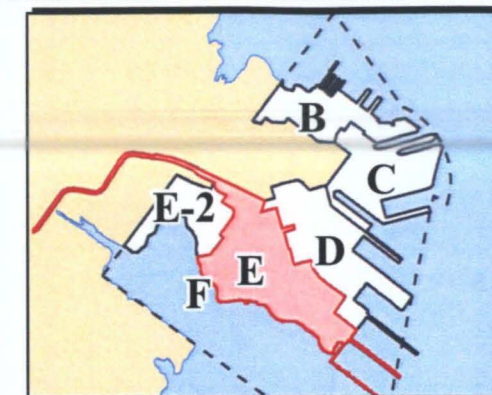
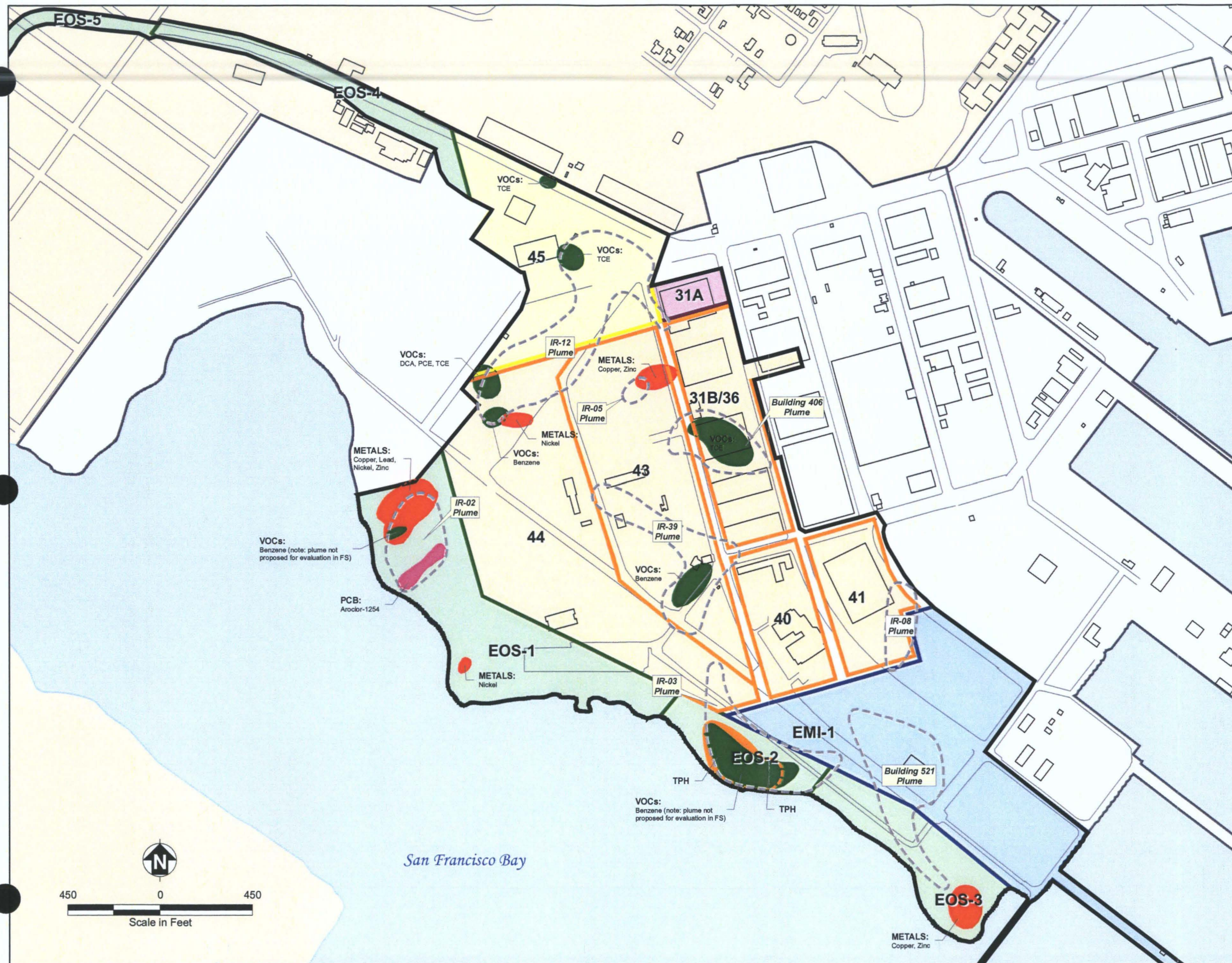
The Revised Parcel E RI Report incorporates soil and groundwater data collected through December 2004 when the revised RI was initiated. Soil and groundwater data collected since December 2004, including removal actions and associated confirmation sample results, will be incorporated in the evaluation of the FS. Remedies, including containment and land use controls, will be evaluated based on risk management decisions as discussed in Section 7.0. Based on knowledge of the parcel and a review of Figures 6-1 and 6-2, the following areas of contamination may require specific additional remedial action at Parcel E:

- PCB hotspot removal action area for potential residual PCBs
- Building 406 TCE source and plume
- Building 709 benzene source and plume
- IR-03 Former Oil Reclamation Ponds Area
- Metals plumes within the open space redevelopment blocks

6.2 REMEDIAL INVESTIGATION CONCLUSION

The Navy first began investigating environmental conditions at Parcel E in 1984. Since that time, more than 20 field investigations, evaluations, and removal actions have been conducted at Parcel E. The comprehensive data set resulting from these activities is of sufficient quantity and quality to complete the objectives of this revised Parcel E RI report: (1) characterize the nature and extent of chemicals in soil, groundwater, and sediment (see Section 4.0); (2) characterize associated human health and ecological risks from exposure to these chemicals (see Section 5.0); and (3) identify areas proposed for evaluation of response actions (presented in Section 7.0). Thus, the data and characterization results presented in this Revised RI Report are sufficient to reach risk management decisions and develop remedial alternatives in the FS Report.

FIGURES



Location Map

2004 Plumes Proposed for Evaluation in the FS¹

- 2004 Metals Plume
- 2004 PCB Plume
- 2004 TPH Plume for FS
- 2004 VOC Plume²

Risk Plume (not proposed for evaluation in the FS)

- Vapor Intrusion Risk Plumes³

Parcel E Reuse Areas and Redevelopment Blocks

- Industrial
- Maritime-Industrial
- Mixed Use
- Open Space
- Research and Development
- Parcel E Boundary
- Other HPS Parcels
- Non-Navy Property
- Building
- Road

Notes:

1 Plumes represent more recent conditions based on the last two quarters of data collected from monitoring wells through December 2004 (see Section 4.1.2.3).

2 VOC plume in open space reuse area will be evaluated in the FS for the application of land use controls as remedy.

3 Risk plumes are based on maximum concentrations from multiple quarters (up to 12) of monitoring data, and are for HHRA purposes only.

IR-52, the railroad right-of-way, is not shown in its entirety in order to better display more detailed information for the remainder of Parcel E.

DCA	1,1-Dichloroethane
FS	Feasibility Study
HHRA	Human Health Risk Assessment
IR	Installation Restoration
PCB	Polychlorinated biphenyl
PCE	Tetrachloroethene
TCE	Trichloroethene
TPH	Total petroleum hydrocarbons
VOC	Volatile organic chemical



Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 6-2

A-AQUIFER GROUNDWATER AREAS PROPOSED FOR EVALUATION IN THE FEASIBILITY STUDY

Revised Remedial Investigation Report for Parcel E

TABLES

TABLE 6-1: REMEDIAL INVESTIGATION SUMMARY
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	IR Site(s)	Triple A Site(s)	Past Activities and Potential Sources	Geology and Hydrogeology	Nature and Extent	Human Health Risk Summary ^{1,2,3}	Ecological Risk Summary ^{4,5}
31A	Mixed Use	IR-36 North (partial)	None	Storage of solvents in buildings; warehouse storage of ship parts	Ground surface: pavement and building foundations	Soil (0 to 10 feet bgs): The screening process identified no contiguous areas that exceeded Parcel E screening criteria for soil. However, the decision to address source areas in the FS Report will be based on the conclusions of the HHRA and the BERA. (See Section 4.3.1.3.1 for additional information.) Groundwater: No 2004 plumes have been identified in A- or B- aquifers.	Soil (0 to 10 feet bgs): The ELCR exceeded 1×10^{-6} in one of two residential risk grids; the COC is bis(2-ethylhexyl)phthalate. The HI exceeded 1 in the other risk grid because of the presence of manganese and vanadium. Grids that exceed thresholds include 058073 and 060074. Groundwater: The ELCR exceeded 1×10^{-6} and the HI exceeded 1 in one A-aquifer groundwater exposure area (IR-12 plume); the COCs are VOCs. No 2004 plumes of VOCs have been identified in A- or B-aquifers.	Not applicable.
					Geologic units: Qaf, Qbm, Kf			
					Hydrostratigraphy: A-aquifer and B-aquifer, separated by Bay Mud aquitard			
					Groundwater flow: northwest toward Pump Station A (A-aquifer); southeast (B-aquifer)			
31B/36	Industrial	IR-36 North (partial) and IR-36 South (partial)	None	Loading/unloading of rail cars; degreasing operations; materials and waste storage	Ground surface: pavement and building foundations	Soil (0 to 10 feet bgs): Three areas of elevated chemical concentrations were identified: <ul style="list-style-type: none">North of Building 413: metals, SVOCs, and TPH (see Figures 4.3.2-2, 4.3.2-3, and 4.3.2-4)South of Building 413: metals, SVOCs, and TPH (see Figures 4.3.2-2, 4.3.2-3, and 4.3.2-4)West and Northwest of Building 406: SVOCs, and VOCs (see Figure 4.3.2-3) (See Section 4.3.2.3.1 for additional information.) Groundwater: 2004 plume of VOCs (TCE) has been identified in A-aquifer at Building 406 (see Figure 4-4 and Section 4.3.2.4.1 for additional information).	Soil (0 to 10 feet bgs): The ELCR exceeded 1×10^{-6} in 8 of 19 industrial risk grids; the COCs are metals (arsenic and lead), benzo(a)pyrene, and naphthalene. Grids that exceed thresholds include AR28, AS28, AS29, AT29, AU29, AU31, AV29, and AV30. Groundwater: The ELCR exceeded 1×10^{-6} and the HI exceeded 1 in three A-aquifer groundwater exposure areas (Building 406 plume, IR-12 plume, and IR-39 plume); the COCs are VOCs. The ELCR exceeded 1×10^{-6} in three B-aquifer groundwater exposure areas (Building 406 plume and residential risk grids 65082 and 71079) and the HI exceeded 1 in two of these areas; the COCs are metals (arsenic and manganese) and VOCs. The 2004 plume of VOCs has been identified in the A-aquifer.	Not applicable.
					Geologic units: Qaf, Qbm, Qu, Kf			
					Hydrostratigraphy: A-aquifer and B-aquifer, separated by Bay Mud aquitard			
					Groundwater flow: north-northwest (A-aquifer); southeast (B-aquifer)			
40	Industrial	IR-11/14/15 and IR-38 (partial), IR-39 (partial)	6, 7	Oily liquid waste disposal; buildings formerly used by NRDL	Ground surface: 50 percent pavement, 50 percent ruderal vegetation	Soil (0 to 10 feet bgs): The screening process identified no contiguous areas that exceeded Parcel E industrial screening criteria for soil. (See Section 4.3.3.3.1 for additional information.) Groundwater: No 2004 plumes have been identified in A- or B-aquifers.	Soil (0 to 10 feet bgs): The ELCR exceeded 1×10^{-6} in two of nine industrial risk grids; the COCs are arsenic and PCBs. Grids that exceed thresholds include AW31 and BA33. Groundwater: The ELCR exceeded 1×10^{-6} and the HI exceeded 1 in one A-aquifer groundwater exposure area (IR-39 plume); the COCs are VOCs. No 2004 plumes of VOCs have been identified in A- or B-aquifers.	Not applicable.
					Geologic units: Qaf, Quus, Qbm, Qu, Kf			
					Hydrostratigraphy: A-aquifer and B-aquifer, separated by Bay Mud aquitard			
					Groundwater flow: west (A-aquifer) and southeast (B-aquifer)			

TABLE 6-1: REMEDIAL INVESTIGATION SUMMARY (CONTINUED)
 Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	IR Site(s)	Triple A Site(s)	Past Activities and Potential Sources	Geology and Hydrogeology	Nature and Extent	Human Health Risk Summary ^{1,2,3}	Ecological Risk Summary ^{4,5}
41	Industrial	IR-08 and IR-38 (partial)	None	Spill of PCB-containing oil in 1988; buildings formerly used by NRDL	Ground surface: small area of ruderal vegetation; remainder pavement and building foundations	Soil (0 to 10 feet bgs): The screening process identified no contiguous areas that exceeded Parcel E screening criteria for soil. (See Section 4.3.4.3.1 for additional information.) Groundwater: No 2004 plumes have been identified in A- or B- aquifers.	Soil (0 to 10 feet bgs): The ELCR exceeded 1×10^{-6} in 4 of 10 industrial risk grids; the COCs are arsenic and PAHs (primarily benzo[a]-pyrene). Grids that exceed thresholds include AX30, BA29, BA30, and BB30.	Not applicable.
41 (cont.)	Industrial	IR-08 and IR-38 (partial)	None	Spill of PCB-containing oil in 1988; buildings formerly used by NRDL	Geologic units: Qaf, Qbm, Qu, Qbm, Qu, Kf		Groundwater: The ELCR exceeded 1×10^{-6} in one A-aquifer groundwater exposure area (IR-08 plume); the COCs are VOCs. No 2004 plumes of VOCs have been identified in A- or B-aquifers.	Not applicable.
					Hydrostratigraphy: A-aquifer and B-aquifer, separated by Bay Mud aquitard Groundwater flow: west-southwest (A-aquifer); southeast (B-aquifer)			
43	Industrial	IR-05, IR-13, IR-36 North (partial), IR-36 South (partial), IR-36 West, IR-39 (partial)	5, 15, and unnumbered fenced area	Use and storage of solvents, oils, acids, and battery solutions in buildings; former service station; disposal of construction debris; oily soil pile/waste liquid drums; storage of sandblast waste	Ground surface: gravel and broken asphalt with vegetation (north and south central area); pavement (center); bare dirt (southern tip) Geologic units: Qaf, Quus, Qbm, Qu, Kf Hydrostratigraphy: A-aquifer and B-aquifer, separated by Bay Mud aquitard Groundwater flow: east-northeast (A-aquifer); southeast (B-aquifer)	Soil (0 to 10 feet bgs): Eight areas of elevated chemical concentrations were identified: <ul style="list-style-type: none"> Western IR-05: PCBs (see Figure 4.3.5-5) Southeast of IR-05: PCBs (see Figure 4.3.5-5) IR-36 North, west of Building 405: metals and SVOCs (see Figures 4.3.5-2 and 4.3.5-4) East of Building 704: metals (see Figure 4.3.5-2) Between Buildings 371 and 709: metals, SVOCs and TTPH (see Figures 4.3.5-2, 4.3.5-4, and 4.3.5-5) Northwest of Building 709: metals and PCBs (see Figures 4.3.5-2 and 4.3.5-5) South of Building 709: metals, VOCs, SVOCs, and PCBs (see Figures 4.3.5-2, 4.3.5-3, 4.3.5-4, and 4.3.5-5) IR-13: metals and SVOCs (see Figures 4.3.5-2 and 4.3.5-4) (See Section 4.3.5.3.1 for additional information.) Groundwater: 2004 plumes of metals and VOCs were identified in A-aquifer: <ul style="list-style-type: none"> Monitoring well PA36MW03A: copper and zinc (see Figure 4-3 and Table 4-3) Monitoring well IR39MW21A: benzene (see Figure 4-4 and Table 4-4) 	Soil (0 to 10 feet bgs): The ELCR exceeded 1×10^{-6} in 20 of 36 industrial risk grids; the COCs are arsenic, VOCs (benzene and naphthalene), PAHs (primarily benzo[a]pyrene), and Aroclor-1260. Grids that exceed thresholds include AO30, AP29, AP31, AQ30, AR31, AR32, AS30, AS32, AS33, AT31, AT32, AT33, AU32, AU33, AU34, AV32, AV33, AV34, AW33, and AW34. Groundwater: The ELCR exceeded 1×10^{-6} and the HI exceeded 1 in four A-aquifer groundwater exposure areas (Building 406 plume, IR-05 plume, IR-12 plume, and IR-39 plume); the COCs are VOCs. The ELCR exceeded 1×10^{-6} and the HI exceeded 1 in one B-aquifer groundwater exposure area (Building 406 plume); the COCs are metals and VOCs. The 2004 plume of VOCs has been identified in the A-aquifer.	Groundwater: 2004 plumes of metals have been identified in A-aquifer.

TABLE 6-1: REMEDIAL INVESTIGATION SUMMARY (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	IR Site(s)	Triple A Site(s)	Past Activities and Potential Sources	Geology and Hydrogeology	Nature and Extent	Human Health Risk Summary ^{1,2,3}	Ecological Risk Summary ^{4,5}
44	Industrial	IR-02 Northwest (partial), IR-02 Central (partial), IR-12 (partial), IR-39 (partial)	3, 4, 17, 19	Radium dial disposal area; dumping and burning waste liquids; disposal of construction and industrial debris; waste liquid disposal trench; buildings used by NRDL; scrap yard dumping of liquid and waste	<p>Ground surface: 50 percent dirt/dirt roads, 25 percent gravel and broken asphalt with vegetation, 25 percent ruderal vegetation</p> <p>Geologic units: Qaf, Quus, Qbm, Qu, Kf</p> <p>Hydrostratigraphy: A-aquifer and B-aquifer, separated by Bay Mud aquitard</p> <p>Groundwater flow: east except along the western border of the redevelopment block, which flows west toward San Francisco Bay (A-aquifer); southeast (B-aquifer)</p>	<p>Soil (0 to 10 feet bgs): Three areas of elevated chemical concentrations were identified:</p> <ul style="list-style-type: none"> Northern portion of Redevelopment Block 44: metals, SVOCs, and PCBs (see Figures 4.3.6-2, 4.3.6-4, and 4.3.6-5) Central portion of Redevelopment Block 44: metals, VOCs, and TTPH (see Figures 4.3.6-2, 4.3.6-3, and 4.3.6-5) Southern portion of Redevelopment Block 44: metals and SVOCs (see Figures 4.3.6-2 and 4.3.6-4) <p>(See Section 4.3.6.3.1 for additional information.)</p> <p>Groundwater: 2004 plumes of metals and VOCs were identified in A-aquifer:</p> <ul style="list-style-type: none"> Monitoring well IR12MW18A: Nickel (see Figure 4-3 and Table 4-3) Monitoring well IR12MW19A: 1,1-DCA and PCE (see Figure 4-4 and Table 4-4) Monitoring well IR12MW17A: Benzene (see Figure 4-4 and Table 4-4) 	<p>Soil (0 to 10 feet bgs): The ELCR exceeded 1×10^{-6} in 16 of 33 industrial risk grids; the COCs are arsenic, lead, VOCs, PAHs (primarily benzo[a]pyrene), and PCBs. The HI exceeded 1 in 3 of 33 risk grids because of the presence of VOCs. Grids that exceed thresholds include AL32, AM32, AM33, AM34, AM35, AN33, AP32, AP37, AQ35, AQ36, AR35, AR36, AR37, AV36, AW36, and AY35.</p> <p>Groundwater: The ELCR exceeded 1×10^{-6} in three A-aquifer groundwater exposure areas (IR-03 plume, IR-12 plume, and IR-39 plume) and the HI exceeded 1 in two of these areas (IR-12 and IR-39 plumes); the COCs are VOCs. The ELCR exceeded 1×10^{-6} in one B-aquifer groundwater exposure area (IR-03 plume); the COCs are arsenic and tetrachloroethene. The 2004 plumes of VOCs have been identified in the A-aquifer.</p>	Groundwater: 2004 plumes of metals have been identified in A-aquifer.
45	Research and Development	IR-04, IR-12 (partial), IR-56, IR-72	3	Scrap yard for metal, drums, pipe lagging, liquid waste, batteries; lumber storehouse; railroad area used to clean metal parts; diesel station; two closed-in-place USTs	<p>Ground surface: gravel and broken asphalt with vegetation (south); pavement (remainder)</p> <p>Geologic units: Qaf, Quus, Qbm, Qu, Kf</p> <p>Hydrostratigraphy: A-aquifer and B-aquifer, separated by Bay Mud aquitard</p> <p>Groundwater flow: east (A-aquifer); southeast (B-aquifer)</p>	<p>Soil (0 to 10 feet bgs): Five areas of elevated chemical concentrations were identified:</p> <ul style="list-style-type: none"> Area northwest of Building 809: metals and SVOCs (see Figures 4.3.7-2 and 4.3.7-3) Area northwest of Building 810: metals, SVOCs and pesticides (see Figures 4.3.7-2, 4.3.7-3 and 4.3.7-4) Area south of Building 810: metals and PCBs (see Figures 4.3.7-2 and 4.3.7-4) Area northeast of Building 810: metals and SVOCs (see Figures 4.3.7-2 and 4.3.7-3) Southern border of Redevelopment Block 45: TTPH (see Figure 4.3.7-4) <p>(See Section 4.3.7.3.1 for additional information.)</p> <p>Groundwater: 2004 plumes of VOCs were identified in A-aquifer:</p> <ul style="list-style-type: none"> Monitoring well IR04MW37A: TCE (see Figure 4-4 and Table 4-4) Monitoring well IR74MW01A: TCE (see Figure 4-4 and Table 4-4) 	<p>Soil (0 to 10 feet bgs): The ELCR exceeded 1×10^{-6} in 27 of 101 residential risk grids; the COCs are arsenic, lead, PAHs (primarily benzo[a]pyrene), PCBs, and dieldrin. The HI exceeded 1 in 46 of 101 residential risk grids primarily because of the presence of manganese; other metals driving risk included antimony, cadmium, copper, iron, mercury, thallium, vanadium, and zinc. Grids that exceed thresholds include 033077, 035079, 036074, 037076, 038074, 038079, 039075, 040073, 040075, 040082, 041075, 041079, 041082, 042073, 042074, 042081, 042082, 043081, 043082, 044079, 045074, 045075, 045078, 046074, 046076, 046082, 047074, 047076, 047089, 048072, 048080, 048089, 049075, 049079, 049088, 050071, 050077, 050080, 050083, 050086, 052075, 052083, 052085, 053081, 053083, 053085, 054074, 054075, 054081, 055073, and 059078.</p> <p>Groundwater: The ELCR exceeded 1×10^{-6} in two A-aquifer groundwater exposure areas (IR-12 plume and residential risk grid 42073) and the HI exceeded 1 in the IR-12 plume area; the COCs are VOCs. The 2004 plumes of VOCs have been identified in the A-aquifer.</p>	Not applicable.

TABLE 6-1: REMEDIAL INVESTIGATION SUMMARY (CONTINUED)

Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	IR Site(s)	Triple A Site(s)	Past Activities and Potential Sources	Geology and Hydrogeology	Nature and Extent	Human Health Risk Summary ^{1,2,3}	Ecological Risk Summary ^{4,5}
EMI-1	Maritime/Industrial	IR-02 Central (partial), IR-02 Southeast (partial), IR-11/14/15, IR-38 (partial), IR-40, IR-54, IR-73	6, 7, 12, 13, 17	Incineration of unknown industrial materials; waste pond area; steam-generating power plant; buildings used by NRD; Pier 2 and electrical substation; woodworking hobby shop, former asphalt manufacturing plant	<p>Ground surface: 30 percent bare dirt (southeast corner); 70 percent ruderal vegetation</p> <p>Geologic units: Qaf, Quus, Qbm, Qu, Kf</p> <p>Hydrostratigraphy: A-aquifer and B-aquifer, separated by Bay Mud aquitard; A-aquifer in direct contact with bedrock water-bearing zone in some locations</p> <p>Groundwater flow: south in the area south of the bedrock high (Shag Rock) and north-northwest in the area north of Shag Rock (A-aquifer); southeast (B-aquifer)</p>	<p>Soil (0 to 10 feet bgs): Eight areas of elevated chemical concentrations were identified:</p> <ul style="list-style-type: none"> Northwest of Building 521: metals and PCBs (see Figures 4.3.8-2 and 4.3.8-4) Northeast of Building 521: SVOCs (see Figure 4.3.8-3) West of Building 521: PCBs (see Figure 4.3.8-4) Southeast of former Building 506: PCBs (see Figure 4.3.8-4) East of former Building 510: metals (see Figure 4.3.8-2) West of former Building 514: metals (see Figure 4.3.8-2) Northern corner of IR-73: SVOCs and TTPH (see Figures 4.3.8-3 and 4.3.8-4) Southwest of former Building 518: TTPH (see Figure 4.3.8-4) <p>(See Section 4.3.8.3.1 for additional information.)</p> <p>Groundwater: No plumes have been identified in A- or B- aquifers.</p>	<p>Soil (0 to 10 feet bgs): The ELCR exceeded 1×10^{-6} in 21 of 34 industrial risk grids; the COCs are metals (arsenic and lead), PAHs (primarily benzo[a]pyrene), and PCBs. The HI exceeded 1 in 1 of 34 risk grids because of the presence of Aroclor-1254. Grids that exceed thresholds include BA34, BB32, BB33, BB34, BC33, BD32, BD33, BD34, BE31, BE32, BE33, BE34, BF31, BF34, BG32, BG33, BG34, BI34, BJ32, BJ33, and BK32.</p> <p>Groundwater: The ELCR exceeded 1×10^{-6} in three A-aquifer groundwater exposure areas (IR-03 plume, IR-08 plume, and Building 521 plume) and the HI exceeded 1 in the Building 521 plume area; the COCs are VOCs. The ELCR exceeded 1×10^{-6} in one B-aquifer groundwater exposure area (IR-03 plume); the COCs are arsenic and tetrachloroethene. No 2004 plumes of VOCs have been identified in A- or B-aquifers.</p>	Not applicable.
EOS-1	Open Space	IR-02 Northwest (partial) and IR-02 Central (partial)	2, 14, 17, 18	Radium dial disposal area; disposal of construction debris, industrial debris, and liquid wastes; firing range	<p>Ground surface: 30 percent bare dirt (east-central area); 70 percent ruderal vegetation</p> <p>Geologic units: Qaf, Quus, Qbm, Qu, Kf</p> <p>Hydrostratigraphy: A-aquifer and B-aquifer, separated by Bay Mud aquitard</p> <p>Groundwater flow: south-southwest toward the shoreline (A-aquifer); southeast (B-aquifer)</p>	<p>Soil (0 to 10 feet bgs): Four areas of elevated chemical concentrations were identified:</p> <ul style="list-style-type: none"> Northern portion of Block EOS-1: metals, SVOCs, PCBs, and TTPH (see Figures 4.3.9-2, 4.3.9-3, and 4.3.9-4) Southwest of Building 600, former firing range and area south of firing range: metals, SVOCs, and PCBs (see Figures 4.3.9-2, 4.3.9-3, and 4.3.9-4) South of Building 600: metals and SVOCs (see Figures 4.3.9-2, 4.3.9-3) Southeast of Building 600 (southeastern portion of Block EOS-1): metals, SVOCs, and PCBs (see Figures 4.3.9-2, 4.3.9-3, and 4.3.9-4) <p>(See Section 4.3.9.3.1 for additional information.)</p> <p>Groundwater: 2004 plumes of metals, VOCs, and PCBs were identified in A-aquifer:</p> <ul style="list-style-type: none"> Monitoring well IR02MW373A: copper, lead, nickel, and zinc (see Figure 4-3 and Table 4-3) Monitoring well IR02MWB-2: nickel (see Figure 4-3 and Table 4-3) Monitoring well IR02MW126A: zinc (see Figure 4-3 and Table 4-3), benzene, naphthalene, and vinyl chloride (see Figure 4-4 and Table 4-4) 	<p>Soil (0 to 2 feet bgs): The ELCR exceeded 1×10^{-6} in 18 of 23 industrial risk grids; the COCs are arsenic, lead, PAHs (primarily benzo[a]pyrene), and Aroclor-1260. The HI exceeded 1 in 7 of 23 risk grids because of the presence of Aroclor 1260. Grids that exceed thresholds include AL35, AL36, AM36, AM37, AM38, AN37, AN38, AN39, AO37, AO39, AQ40, AR39, AR40, AS38, AT38, AT39, AU37, AV37, and AW37.</p> <p>Groundwater: The ELCR exceeded 1×10^{-6} and the HI exceeded 1 in one B-aquifer groundwater exposure area (IR-02 plume); the COCs are arsenic and manganese.</p> <p>Sediment: The ELCR exceeded 1×10^{-6} and the HI exceeded 1 in sediment along the shoreline. The COCs are chromium and total PCBs.</p>	<p>Soil: Copper, lead, and total Aroclors may pose a risk to birds and mammals ingesting soil and soil-associated food items.</p> <p>Groundwater: Based on comparison with surface water criteria, metals, pesticides, and PCBs have the potential to affect the Bay. 2004 plumes of metals have been identified in the A-aquifer. A 2004 plume of PCBs (Aroclor-1254) has been identified in the A-aquifer.</p> <p>Sediment: Metals and total PCBs may pose a risk to benthic invertebrates, birds, and mammals.</p>

TABLE 6-1: REMEDIAL INVESTIGATION SUMMARY (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	IR Site(s)	Triple A Site(s)	Past Activities and Potential Sources	Geology and Hydrogeology	Nature and Extent	Human Health Risk Summary ^{1,2,3}	Ecological Risk Summary ^{4,5}
EOS-1 (Continued)	Open Space	IR-02 Northwest (partial) and IR-02 Central (partial)	2, 14, 17, 18	Radium dial disposal area; disposal of construction debris, industrial debris, and liquid wastes; firing range	(see above)	<ul style="list-style-type: none">Monitoring well IR02MW372A: alpha-chlordane, gamma-chlordane, heptachlor epoxide, and Aroclor-1254 (see Figure 4-5 and Table 4-5), and naphthalene (see Figure 4-4 and Table 4-4)Monitoring well IR02MWB-3: Aroclor-1254 (see Figure 4-5 and Table 4-5) Sediment: Metals concentrations at most locations along the EOS-1 shoreline exceeded ambient concentrations for bay sediments. Specifically, concentrations of copper and lead exceeded ambient sediment concentrations (68.1 mg/kg for copper and 43.2 mg/kg for lead) (Water Board 1998) in all areas. Concentrations of PCBs exceeded the nearshore ambient concentration of 0.20 mg/kg (Water Board 2003) in most locations along the entire Parcel E shoreline. As a result, all locations along the Parcel E shoreline are considered to be a potential source of contamination.	(see above)	(see above)
EOS-2	Open Space	IR-02 Central (partial), IR-03	17	Former oil reclamation ponds; dumping of liquid and sandblast waste	Ground surface: gravel, broken asphalt, vegetation	Soil (0 to 10 feet bgs): The screening process identified concentrations of chemicals throughout Redevelopment Block EOS-2 that exceeded Parcel E screening criteria, including metals, SVOCs, PCBs, and TTPH (see Figures 4.3.10-2, 4.3.10-4, and 4.3.10-5) (See Section 4.3.10.3.1 for additional information.) Groundwater: 2004 plumes of VOCs (benzene) and TPH were identified in A-aquifer; in addition arsenic, 1,4-DCB, naphthalene, vinyl chloride, and Aroclor-1260 were consistently detected in groundwater based on historical data (see Figures 4-3, 4-4, and 4-6 and Tables 4-3 through 4-6 and Section 4.3.10.4.1) Sediment: Metals concentrations at most locations along the EOS-2 shoreline exceeded ambient concentrations for bay sediments. Specifically, concentrations of copper and lead exceeded the ambient sediment concentrations (68.1 mg/kg for copper and 43.2 mg/kg for lead) (Water Board 1998) in all areas. Concentrations of PCBs exceeded the nearshore ambient concentration of 0.20 mg/kg (Water Board 2003) in most locations along the entire Parcel E shoreline. As a result, all locations along the Parcel E shoreline are considered to be a potential source of contamination.	Soil (0 to 2 feet bgs): The ELCR exceeded 1×10^{-6} in nine of nine industrial risk grids; the COCs are arsenic, lead, PAHs (primarily benzo[a]pyrene), and Aroclor-1260. The HI exceeded 1 in two of nine risk grids because of the presence of Aroclor 1260. Grids that exceed thresholds include AX36, AX37, AY36, AY37, AZ36, AZ37, BA36, BA37, and BB36. Groundwater: The ELCR exceeded 1×10^{-6} and the HI exceeded 1 in one B-aquifer groundwater exposure area (IR-03 plume); the COCs are arsenic and tetrachloroethene. Sediment: The ELCR exceeded 1×10^{-6} and the HI exceeded 1 in sediment along the shoreline. The COCs are chromium and total PCBs.	Soil: Copper, lead, and total Aroclors may pose a risk to birds and mammals ingesting soil and soil-associated food items. Groundwater: Based on comparison with surface water criteria, metals, pesticides, and PCBs have the potential to affect the Bay. Sediment: Metals and total PCBs may pose a risk to benthic invertebrates, birds, and mammals.
					Geologic units: Qaf, Quus, Qbm, Qu, Kf			
					Hydrostratigraphy: A-aquifer and B-aquifer, separated by Bay Mud aquitard and permeable bedrock			
					Groundwater flow: north (A-aquifer); southeast (B-aquifer)			

TABLE 6-1: REMEDIAL INVESTIGATION SUMMARY (CONTINUED)
 Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	IR Site(s)	Triple A Site(s)	Past Activities and Potential Sources	Geology and Hydrogeology	Nature and Extent	Human Health Risk Summary ^{1,2,3}	Ecological Risk Summary ^{4,5}
EOS-3	Open Space	IR-02 Central (partial), IR-02 Southeast (partial)	13, 17	Removed AST S-505 used to store PCB-containing liquid waste that was dumped along shoreline; former burn disposal area (metal debris reef); dumping of liquids and sandblast waste	<div>Ground surface: ruderal vegetation; riprap along shoreline</div> <div>Geologic units: Qaf, Quus, Qbm, Qu, Kf</div> <div>Hydrostratigraphy: A-aquifer and B-aquifer, separated by Bay Mud aquitard and permeable bedrock</div> <div>Groundwater flow: south-southwest during wet season, north-northwest during dry season (A-aquifer); southeast (B-aquifer)</div>	<div>Soil (0 to 10 feet bgs): Two areas of elevated chemical concentrations were identified: <ul style="list-style-type: none"> Central portion of Redevelopment Block EOS-3, in the area south of the bermed area: metals, SVOCs, and PCBs (see Figures 4.3.11-2, 4.3.11-3, and 4.3.11-5) Southern portion of Redevelopment Block EOS-3: metals, SVOCs, pesticides, PCBs, and dioxin/furans (see Figures 4.3.11-2, 4.3.11-3, 4.3.11-4, and 4.3.11-5) (See Section 4.3.11.3.1 for additional information.) </div> <div>Groundwater: A 2004 plume of metals was identified in A-aquifer: <ul style="list-style-type: none"> Monitoring Well IR02MW300A: copper and zinc (see Figure 4-3 and Table 4-3) </div> <div>Sediment: The highest copper and lead concentrations in sediments were found in EOS-3, in IR-02 Southeast. Metals concentrations at most locations along the EOS-3 shoreline exceeded ambient concentrations for Bay sediments. Specifically, concentrations of copper and lead exceeded ambient sediment concentrations (68.1 mg/kg for copper and 43.2 mg/kg for lead) (Water Board 1998) in all areas. The highest PCB concentrations in sediments were found in EOS-3, in IR-02 Southeast. Concentrations of PCBs exceeded the nearshore ambient concentration of 0.20 mg/kg (Water Board 2003) in most locations along the entire Parcel E shoreline. As a result, all locations along the Parcel E shoreline are considered to be a potential source of contamination.</div>	<div>Soil (0 to 2 feet bgs): The ELCR exceeded 1×10^{-6} in 9 of 11 industrial risk grids; the COCs are metals (arsenic and lead), PAHs (primarily benzo[a]pyrene), Aroclor-1260, dieldrin, and dioxins/furans. Grids that exceed thresholds include BC36, BE35, BE36, BF35, BF36, BG35, BG36, BH36, and BI36.</div> <div>Groundwater: The ELCR exceeded 1×10^{-6} and the HI exceeded 1 in two B-aquifer groundwater exposure areas (IR-03 plume and grid 99102); the COCs are arsenic, manganese, and tetrachloroethene.</div> <div>Sediment: The ELCR exceeded 1×10^{-6} and the HI exceeded 1 in sediment along the shoreline. The COCs are chromium and total PCBs.</div>	<div>Soil: Copper, lead, and total Aroclors may pose a risk to birds and mammals ingesting soil and soil-associated food items.</div> <div>Groundwater: Based on comparison with surface water criteria, metals, pesticides, and PCBs have the potential to affect the Bay. 2004 plumes of metals have been identified in the A-aquifer.</div> <div>Sediment: Metals and total PCBs may pose a risk to benthic invertebrates, birds, and mammals.</div>
EOS-4	Open Space	IR-52 (partial), IR-56 (partial)	None	Railroad yard area; railroad right-of-way	<div>Ground surface: 70 percent exposed soil; 30 percent pavement</div> <div>Geologic units: Qaf, Quus, Qbm, Qu, Kf</div> <div>Hydrostratigraphy: A-aquifer and B-aquifer, separated by Bay Mud aquitard</div> <div>Groundwater flow: No information available</div>	<div>Soil (0 to 10 feet bgs): The screening process identified no areas that exceeded Parcel E screening criteria for soil. (See Section 4.3.12 for additional information.)</div>	<div>Soil (0 to 2 feet bgs): The ELCR did not exceed 1×10^{-6} and the HI did not exceed 1 in either of the two industrial risk grids.</div>	Not applicable

TABLE 6-1: REMEDIAL INVESTIGATION SUMMARY (CONTINUED)
Revised Remedial Investigation Report for Parcel E, Hunters Point Shipyard, San Francisco, California

Redevelopment Block	Planned Reuse	IR Site(s)	Triple A Site(s)	Past Activities and Potential Sources	Geology and Hydrogeology	Nature and Extent	Human Health Risk Summary ^{1,2,3}	Ecological Risk Summary ^{4,5}
EOS-5	Open Space	IR-52 (partial)	None	Railroad right-of-way	Ground surface: exposed soil	Soil (0 to 10 feet bgs): The screening process identified no contiguous areas that exceeded Parcel E screening criteria for soil. However, at one isolated boring location (IR52B009) six SVOCs exceeded industrial screening criteria. (See Section 4.3.13 for additional information.)	Soil (0 to 2 feet bgs): The ELCR exceeded 1×10^{-6} in the one industrial risk grid (ZZ01) present in this redevelopment block; the COCs are metals (arsenic and lead) and benzo(a)pyrene.	Not applicable.
					Geologic units: Qaf; no other information available			
					Hydrostratigraphy: A-aquifer and B-aquifer, separated by Bay Mud aquitard			
					Groundwater flow: No information available			

Notes:

- 1Total incremental RME cancer risk and HI were calculated for exposure areas with data for soil from 0 to 2 feet bgs in open space reuse areas and 0 to 10 feet bgs for other areas. Information presented is based on grids containing data and on planned reuse. Information presented does not include the construction worker.
- 2Total RME cancer risk and HI were calculated for A-aquifer groundwater for the vapor intrusion exposure pathway in non-open space reuse areas.
- 3Total RME cancer risk and HI were calculated for B-aquifer groundwater for domestic use.
- 4Ecological risk from exposure to soils was assessed in a single exposure unit comprising Redevelopment Blocks EOS-1, EOS-2, and EOS-3.
- 5Ecological risk from exposure to sediment was assessed in a single exposure area for the entire HPS shoreline; the results were applied to the Parcel E shoreline area along Redevelopment Blocks EOS-1, EOS-2, and EOS-3.

AST	Aboveground storage tank	PCB	Polychlorinated biphenyl
BERA	Baseline ecological risk assessment	Qaf	Artificial Fill
bgs	Below ground surface	Qbm	Bay Mud Deposits
COC	Chemical of concern	Qu	Undifferentiated Sedimentary Deposits
DCB	Dichlorobenzene	Quus	Undifferentiated Upper Sand Deposits
ELCR	Excess lifetime cancer risk	RME	Reasonable maximum exposure
FS	Feasibility study	SVOC	Semivolatile organic compound
HHRA	Human health risk assessment	TCE	Trichloroethene
HI	Hazard index	TPH	Total petroleum hydrocarbons
HPS	Hunters Point Shipyard	Triple A	Triple A Machine Shop, Inc.
IR	Installation Restoration	TTPH	Total total petroleum hydrocarbons
Kf	Franciscan complex bedrock	UST	Underground storage tank
mg/kg	Milligram per kilogram	VOC	Volatile organic compound
NRDL	Naval Radiological Defense Laboratory	Water Board	San Francisco Bay Regional Water Quality Control Board
PAH	Polynuclear aromatic hydrocarbon		

Sources:

Water Board. 1998. "Staff Report: Ambient Concentrations of Toxic Chemicals in San Francisco Bay Sediments." May.

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7.0 RECOMMENDATIONS

The data and characterization results presented in this Revised RI Report are sufficient to make risk management decisions and develop remedial alternatives in the FS. This section discusses the risk management factors used in assessing what Parcel E areas should be evaluated in the FS Report. This section also introduces proposed RAOs that will be used to develop remedial alternatives in the FS Report.

7.1 RISK MANAGEMENT AND AREAS PROPOSED FOR FEASIBILITY STUDY EVALUATION

Risk management requires both sound science and professional judgment. Risk management involves balancing risk assessment information and the technical feasibility of remedial alternatives with social and political factors and the economic feasibility of remedial alternatives (EPA 2006). According to the California Environmental Protection Agency, Office of Environmental Health Hazard Assessment (OEHHA), it is usually not possible or feasible to remove all traces of a chemical once it has been released into the environment; therefore, the goal of risk management is to reduce the health risks associated with exposure to hazardous pollutants to a negligibly low level (OEHHA 2001).

According to the OEHHA, a cancer risk of $1\text{E-}06$ from life-long exposure to a hazardous chemical is generally presumed to be an "acceptable risk" level because the risk is extremely low compared to the overall cancer rate. Risk management decisions may be set at less stringent risk levels, such as $1\text{E-}05$ or $1\text{E-}04$. These less stringent risk levels are generally viewed as acceptable if there is no technically or economically feasible way to reduce the risks further (OEHHA 2001).

Similarly, EPA guidance on exposure levels considered protective of human health is presented to aid in the interpretation of the results of the risk assessment. In the NCP, EPA defined general remedial action goals for sites on the National Priorities List (Title 40 of the Code of Federal Regulations Part 300.430). The goals include a range for residual cancer risk, which is "an excess upper-bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6} ," or 1 in 10,000 to 1 in 1,000,000. The goals set out in the NCP are applied once a decision to remediate a site has been made. A more recent EPA directive provides additional guidance on the role of the HHRA in supporting risk management decisions, and in particular, determining if remedial action is necessary (EPA 1991). Specifically, the guidance states, "Where cumulative carcinogenic risk to an individual based on reasonable maximum exposure for both current and future land use is less than 10^{-4} , and the noncancer HQ is less than 1, action generally is not warranted unless there are adverse environmental impacts." EPA Region 9 has stated, however, that action may be taken to address risks between $1\text{E-}04$ and $1\text{E-}06$. In addition, DTSC has stated that it considers $1\text{E-}06$ as the point of departure for risk management decisions. To be protective of human health, the BCT has chosen to use $1\text{E-}06$, the lower end of the residual $1\text{E-}04$ to $1\text{E-}06$ risk range set out in the NCP, as a threshold level for cancer risks for HPS.

At HPS, several risk management factors affect the soil areas identified for further evaluation in the FS. For metals, HPALs are statistically determined values representative of ambient conditions (PRC 1995); however, some HPALs pose a cancer risk greater than $1E-06$ (arsenic) and an HI greater than 1.0 (iron, manganese, mercury, thallium, and vanadium). The Navy does not propose evaluating response actions for metals concentrations at or below the HPALs in the FS. For several PAHs and pesticides, the risk-based screening concentrations are below the PQLs and cannot be measured; therefore, the screening concentrations were adjusted to equal the PQLs. However, some of the PQLs [for example, benzo(a) pyrene PQL is 330 micrograms per kilogram] pose a cancer risk greater than $1E-06$. The Navy does not propose evaluating response actions for PAH at concentrations below PQLs in the FS if the PQL is greater than the risk-based concentration.

Several risk management factors affect the groundwater areas identified for further evaluation in the FS Report. For metals, HGALs are values representative of ambient metals concentrations in groundwater at HPS (PRC 1996f); however, some HGALs exceed surface water criteria. The Navy does not propose evaluating response actions for metals concentrations at or below HGALs in the FS. For VOCs, vapor intrusion risk (associated with indoor air in buildings) is not evaluated in the open space redevelopment blocks under the recreational scenario. VOCs in groundwater do not pose a risk to aquatic wildlife in the Bay because VOCs volatilize quickly in the turbulent shoreline environment. The Navy will evaluate ARARs, institutional controls, and land use controls for the groundwater within the open space redevelopment blocks in the FS. However, the Navy does not propose evaluating active remedial options for VOCs in groundwater within the open space redevelopment blocks in the FS.

All Parcel E redevelopment blocks include areas of soil that are proposed for further evaluation in the FS based on the potential to pose risks to human health or the environment under the planned reuse scenarios. As shown on Figures 5-5, 5-6, and 5-7, not all risk assessment grids pose risks greater than $1E-06$ and data are not available for all grids. However, the Navy intends to implement some remedies on a redevelopment block-wide or parcel-wide basis to be protective and based on experience at other HPS parcels.

Groundwater areas that are proposed for further evaluation in the FS based on the potential to pose risks to human health or the environment under the planned reuse scenarios are shown on Figure 6-2. Figure 6-2 shows the risk plumes identified on Figure 5-8 overlaid by the 2004 groundwater plumes delineated for VOCs, metals, PCBs, and TPH (see Figures 4-3, 4-4, 4-5, and 4-6).

Groundwater in the B-aquifer is proposed for further evaluation in the FS, because the beneficial use evaluation concluded that the B-aquifer is moderately suitable as a potential drinking water source based on state groundwater classification criteria and federal SSFs. Sediments along the entire Parcel E shoreline are proposed for further evaluation in the FS Report.

Data are not available in some Parcel E areas because sampling activities were focused primarily around known sources of contamination; as a result, the potential risk to human health and the environment in these areas is unknown. The Navy will address areas where little or no data are

available and there remains uncertainty in the potential risk associated with exposure to soil, groundwater, and sediment by including these areas in the FS. Alternatives evaluated in the FS for these areas will seek to limit or eliminate pathways of exposure to soil, groundwater, and sediment to ensure protectiveness of human health and the environment.

7.2 PRELIMINARY REMEDIAL ACTION OBJECTIVES

For the soil, groundwater, and sediment areas identified above, the FS Report will develop remedial alternatives, based on RAOs, that protect human health and the environment by either (1) limiting or eliminating pathways of exposure to COCs or (2) reducing chemical concentrations. Based on the results of this Revised RI Report, preliminary RAOs were developed to support the FS process. RAOs are medium-specific goals for protection of human health and the environment that specify (1) COCs, (2) exposure route and receptors, and (3) preliminary remediation goals for each medium of concern. Consistent with EPA guidance (EPA 1995), the RAOs for Parcel E are based on the planned reuse of each redevelopment block within Parcel E. Chemical-specific remediation goals for soil, groundwater, and sediment will be developed as part of the FS.

Preliminary Remedial Action Objectives for Soils

The following preliminary RAOs were developed for Parcel E soil based on protection of human health and results of the incremental risk assessment:

- Prevent exposure to inorganic and organic chemicals in soil at concentrations above the remediation goals for carcinogens or noncarcinogens for the following exposure pathways:
 - Inhalation of particulate and volatile chemicals released to ambient air from, ingestion of, and dermal contact with soil from 0 to 10 feet bgs by residents in areas zoned for research and development or mixed-use reuse
 - Ingestion of homegrown produce by residents in areas zoned for research and development or mixed-use reuse
 - Inhalation of particulate and volatile chemicals released to ambient air from, ingestion of, and dermal contact with soil from 0 to 10 feet bgs by industrial workers in areas zoned for industrial and maritime/industrial reuse
 - Inhalation of particulate and volatile chemicals released to ambient air from, ingestion of, and dermal contact with soil from 0 to 2 feet bgs by recreational users in areas zoned for open space reuse
 - Inhalation of particulate and volatile chemicals released to ambient air from, ingestion of, and dermal contact with soil from 0 to 10 feet bgs by construction workers in all areas
- Prevent exposure to VOCs in soil gas at concentrations that would pose unacceptable risk via indoor inhalation of vapors.

The BERA concluded that risk to wildlife is not considered significant and does not warrant response action based only on ecological concerns; therefore, no ecological RAO for soil is proposed. However, ecological benchmarks will be considered during any response action undertaken to address risk identified in the HHRA.

Preliminary Remedial Action Objectives for Groundwater

Preliminary RAOs for Parcel E groundwater were developed based on (1) protection of human health from inhalation exposure to volatile chemicals that migrate from the A-aquifer through the subsurface to indoor air (vapor intrusion), (2) protection of human health from exposure to chemicals in the B-aquifer from domestic use, (3) protection of human health from inhalation exposure to and dermal contact with chemicals in the A-aquifer during construction activities involving trenching, and (4) protection of aquatic wildlife from potential migration of chemicals in groundwater to the Bay. The following preliminary RAOs were identified for groundwater at Parcel E:

- Prevent inhalation exposure to volatile chemicals in the A-aquifer that migrate to indoor air from subsurface vapor intrusion at concentrations above remediation goals.
- Prevent direct exposure to chemicals in the B-aquifer groundwater from domestic use at concentrations above remediation goals.
- Prevent or minimize inhalation of and dermal contact with inorganic and organic chemicals in the A-aquifer by construction workers at concentrations above remediation goals.
- Prevent or minimize migration of chemicals in A-aquifer and B-aquifer groundwater to the surface water of the Bay that could adversely affect surface water. This RAO is intended to provide protection of the beneficial uses of the Bay, including aquatic wildlife.

Preliminary Remedial Action Objectives for Sediment

The following preliminary RAO was developed for sediment in the intertidal zone at Parcel E based on protection of human health:

- Prevent direct exposure and exposure through shellfish ingestion to organic and inorganic chemicals at concentrations above remediation goals in sediment along the shoreline

The following preliminary RAO was developed for sediment in the intertidal zone at Parcel E based on protection of wildlife:

- Prevent exposure of benthic invertebrates, birds, and mammals to inorganic and organic chemicals at concentrations above remediation goals in sediment along the shoreline

The FS will further develop the preliminary RAOs and identify general response actions and remedial alternatives that meet the RAOs. Finally, the FS will evaluate the remedial alternatives based on evaluation criteria in the NCP to complete the RI/FS process for nonradiological CERCLA-regulated hazardous substances.

Areas where TPH and CERCLA-regulated chemicals are commingled are addressed in this revised Parcel E RI report and will be evaluated further in the FS. However, at TPH sites where the CERCLA chemicals may be related to a release of fuels or other hydrocarbons, these CERCLA chemicals are addressed under the TPH program. Radiological issues are being addressed separately under the basewide radiological program. The results of the CERCLA and basewide radiological programs will be combined in a single Proposed Plan and Record of Decision that addresses contamination from nonradiological CERCLA-regulated hazardous substances and radioactive materials.

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